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The Pursuit of Intoxication

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Published by
Alcoholism and Drug
Addiction Research Foundation
Toronto
An Agency of the Province of Ontario

The Pursuit of Intoxication

Andrew I. Malcolm

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Library of Congress Catalog
Card Number: 70 — 142249

Printed and bound in Canada
by Thorn Press, Toronto

Foreword

Only a few years ago, the subject of drugs in Western society was the special preserve of medical researchers, practising physicians, pharmacists, and nurses. Most citizens were interested only in the drugs with which they came into contact as patients, and very often the names of these would be more or less forgotten once illness passed off.

It is true that many people had more than a passing acquaintance with two very powerful drugs — alcohol and nicotine — as recreational rather than medicinal substances, and that most people were aware of the existence of a few "addicts" who appeared to live in a world apart. But neither the familiar alcohol and nicotine nor the well-known "drugs of addiction" (heroin, morphine, cocaine) were commonly seen as having any relationship to such drugs as Aspirin, the antihistamines, codeine, the sedatives, the stimulants, or the tranquillizers. It is the emergence of widespread use of illicit drugs among young people that has caused the topic of drugs to move beyond the realm of specialists and into everyday conversation of alarmed parents, teachers, clergymen, and community leaders. The hearings and deliberations of the Commission of Inquiry into the Non-Medical Use of Drugs have pointed up the importance of informed public discussion of the subject. To date, discussion has been widespread, but perspective has often been narrow. Many people are concerned, but few have sufficient background knowledge to be really comfortable with the topic.

For those interested in and concerned about the effects of such highly publicized and controversial substances as marihuana, LSD, mescaline, and speed, the author of this book, Dr. Andrew I. Malcolm, has undertaken to provide a very broad frame of reference A medical doctor who has specialized in psychiatry Dr. Malcolm begins by pointing out that man has, fo centuries, constantly sought ways of altering his norma state of consciousness, and that the use of certain kind of drugs is only one of the methods by which he ha learned to accomplish this. Attention is drawn to the fact that the effects of such drugs have not been broadly harmful to a given society when the chemicals have been used in a religious or cultural setting which ha placed some generally acceptable restrictions on frequency of use and/or on degree of intoxication. (Th same drugs can be harmful if transplanted as recreational chemicals to new settings in which such socia controls are absent.)

Moving into the medical area, Dr. Malcolm discusses the various classes of drugs used by physicians to alter the consciousness of patients. It is with these that medical practitioners bring relief from pain, help the wakeful to sleep, stimulate and cheer the depressed, and calm the anxious. In addition to describing common medical uses of the opiates, the sedative-hypnotics, the stimulants, the antidepressants, and the tranquillizers, the author discusses side effects and examines the fact that some very useful drugs can become dangerous to the patient who is vulnerable to drug dependence. The medical section of the book concludes with a brief account of the search for chemical cures for mental illness — a search which, strangely enough, centres upon some of today's most controversial drugs (such hallucinogens as LSD, for example) because of their very complex relationships with certain hormones occurring naturally in the human brain. Later sections of the book are concerned with the use of drugs in special situations (sports, brainwashing, suicide, murder, and war) and finally with the use of a growing number of drugs as forms of recreation.

The reader is reassured throughout that the use of mind-altering drugs is nothing new; he is at the same time made acutely conscious of the delicate chemical balance that exists in the human nervous system and of the risks that can be involved in interfering with this.

Not all of this book makes easy reading. Although the author explains a great many special terms as he goes along, some of the chapters (especially in the medical section) inevitably make unusual demands on the reader. I believe, nevertheless, that many people who are genuinely concerned about changing patterns of drug use in our society will be able to use Dr. Malcolm's book as a source of historical and scientific information that will be helpful in arriving at a reasoned position on a complex and vitally important social issue. The fact that they will encounter within the book a number of personal opinions and hypotheses developed by the author will add to its interest.

Readers who find themselves in agreement with Dr. Malcolm will welcome this book and will probably refer to it frequently. Those who disagree with some of the ideas put forward will be interested in the results of upcoming studies designed to test them out. Those who reject other arguments presented here will find challenge in attempting to refute them.

H. David Archibald,
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Toronto.

Part 1

RELIGION

PART

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Preface

Intoxicating substances have been used by men for thousands of years in nearly every part of the world and for a great variety of reasons. This book considers the psychoactive drugs themselves and the reasons for their ancient and modern use in five overlapping categories.

It would seem that everywhere, except perhaps in Tierra del Fuego and in the high Arctic, man has discovered plants that have yielded substances with magical properties. These juices and powders, on being properly prepared and consumed, have caused desirable alterations of consciousness. A supplicant, having prepared himself through the use of such a substance, would feel more certain of being able to commune with the gods. Because it seems likely that the earliest use of drugs was for such a purpose, the category of religion will be considered first.

In its earliest and most primitive forms, the art of healing was basically religious in nature. However, with the tendency toward specialization commonly seen in every aspect of civilization, medicine gradually emerged as a distinct entity. The further development of medical and pharmacologic science — and especially the extraordinary expansion of knowledge in these fields that has occurred in very recent times — will be discussed in Part 2.

Part 3 will deal with the peculiarly human tendency for healthy men to seek to exceed the limits of their strength through the use of stimulating chemicals in the practice of war, sports, and certain types of fatiguing work, both mental and physical.

Part 4 will consider intoxicating substances that can be used to incapacitate or kill. This sort of use is precisely opposite in intent to the use of drugs in hygiene, and yet its evolution has proceeded in parallel to that of medical science. It has always been the dark mirror image of hygiene. Today the science of killing is as refined as is the science of healing. In both of these advanced disciplines the use of intoxicating drugs is fundamentally important.

The fifth category in which the use of drugs will be considered is that of pleasure. Some drugs have been used for many centuries because they promoted conviviality or caused novel and entertaining mental aberrations. For many people euphoria and mental oblivion are most agreeable states. Part 5 will deal with the rugs that have most commonly been used in the pur- uit of such experiences.

These categories are all exceedingly ill-defined. A iven drug may be used at various times for several r all of these reasons. Alcohol, for example, appears n nearly every section. Moreover, the use of a drug for ome primary reason may well confer effects that satisfy ifferent needs. For example, an amphetamine taken to educe the appetite in cases of obesity may produce uphoria. Indeed, discoverers of this surprising side ffect may gradually shift their basic reason for using he drug from the medical to the furtively recreational.

This book is not in any sense intended to be an xhaustive treatment of this immense subject. There re available today a number of excellent works dealing ith the psychoactive drugs, and these should be con- ulted if more technical information is required regard- ng any of the substances referred to here. On the other and, it is hoped that this broad review of the intoxicat- ng drugs will at least impart to the reader a general nowledge of an increasingly complex field of study.

Throughout, I have attempted to give whatever nformation there is concerning the various drugs that ost students of the subject would agree upon. How- ver, I have undoubtedly included a good many pinions of my own. These I am prepared to defend, ut I am at the same time aware that it is altogether easonable for others to attack them. For example, there re several references in the text to my theory of chemi- al conversion. This is the hypothesis that certain vul- erable users of drugs that produce altered states of con- ciousness may experience fixation of their beliefs and hat this most limiting condition tends, through reinforcement, to be very persistent if not irreversible. That this process occurs and that it is quite similar to brainwashing seems likely to me, but it is important to remember that it is an hypothesis and that it therefore must not be regarded as having been established by objective scientific study. It may be, however, that many elements of this theory can be subjected to such study. Perhaps some of the questions raised in this book, and the answers tentatively offered, will be examined and clarified over the next few years. In the meantime, it is my hope that the matters of fact that form the largest part of the book will prove useful to people in need of such a general review.

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MARCH, 1971.

1.

The Desire to Alter Consciousness

Hundreds of thousands of years ago a primate, *Australopithecus,* lived on the Central African plain. This beast gave up the herbivorous way of life characteristic of other primates and undertook to compete with the great cats as a flesh-eating predator, a task for which it appeared that he was poorly equipped. He had no protective coverings, his fangs were unimpressive, he had no claws, his running was inadequate, and his climbing was comparatively awkward. It is astonishing that he survived. (1)

Numbers in parentheses indicate references listed at the back of the book, beginning on page 361.

Australopithecus achieved survival by assuming a number of traits typical of the carnivores while retaining many primate characteristics. Like the cats and dogs he established nests and thereupon began his long association with lice and fleas. *Australopithecus* formed himself into small troops and became, like the carnivores, co-operative in offence and defence. He developed particular feelings of amity toward the members of his own troop, especially his mate and offspring; and he developed hostility, or at least an exclusive attitude, toward members of alien troops. In short, he became both communal and territorial. (2) Even so, this unlikely predator could not have survived had he not picked up a piece of bone and learned to wield it as a weapon. *Australopithecus*, in time, became *Homo sapiens*. And man, in time, became the fiercest, most persistent, and most cunning killer ever to appear in the world.

Although stone age man was a successful predator, he had little protection from many threatening aspects of his environment. (3) Pestilence, starvation, injury, and a variety of natural catastrophes held his numbers down and filled his brief life with terror and awe. It was probably in response to his own increasing consciousness of his personal frailty vis-à-vis these terrible forces that he began to develop defensive religious systems. Gods were defined in terms of the mysteries of nature; as such, they were eternally threatening and their punishments were terrible. They had to be appeased. But to appease, man must in some sense approach, and it seemed presumptuous to try to communicate personally with such exalted figures as the gods. Consequently, certain men emerged who seemed peculiarly well qualified to intervene on behalf of the less gifted members of the group. These were the medicine men, priests, or shamans. These men were deviants through illness, great intelligence, or physical power and were looked upon with awe. But even these very special men could not presume to speak directly to the gods. Some aid to the achievement of the mystical state was required. Some way of altering states of consciousness was necessary so that the limited mind of man could be elevated and released from its burdensome inhibitions. On some extraterrestrial plane the priest's mind might communicate with the gods. In this way these dreaded beings, appeased, might withhold their wrath. While thus surpassing the limits of his ego and communing with the divine power, the priest could also receive instructions as to the proper course for the people to follow in their future lives.

Consciousness expansion as a means of facilitating the mystical experience is probably as ancient as social man. In every period of time, and in nearly every part of the world, ways of altering consciousness have been devised. These take many forms, of which the use of mind-altering drugs is only one.

WAYS OF ALTERING CONSCIOUSNESS

For the maintenance of normal waking consciousness, there is an optimal range for the reception of stimuli from both outside and inside the body. Levels of stimulation that are either diminished or excessive may lead to altered states of consciousness. Such states can be achieved in many ways. (4)

Temple sleep as practised by the early Egyptians, Greeks, and Romans was an altered state of consciousness resulting from greatly reduced sensory input. Mental aberrations in jet pilots, experimental sensory deprivation states, hypnotic trance, and kayak disease in Eskimos who have spent many days at sea hunting seals are further examples of such conditions.

On the other hand, greatly increased sensory bombardment such as is found in brainwashing techniques can also alter consciousness. Strenuous physical activity may have the same effect. Dance trances in response to rhythmical drumming, the dancing epidemics of the Middle Ages, spirit possession during revivalistic or tribal religious ceremonies, and orgiastic trances as experienced in Bacchanalian rites are examples of this.

Altered states of consciousness can also result from periods of excessive mental alertness. Prolonged and fervent praying and constant vigilance in the crow's-nests of ships or at the radar screen are examples of activities that can produce effects of this kind.

Markedly decreased alertness can also result in an altered state of consciousness. Examples of this would be such mystical, transcendental, or revelatory states as satori or samadhi which are attained through prolonged meditation. Autohypnotic trances induced by Indian fakirs, mystics, or Pythian priestesses belong in this category.

Finally, an altered state of consciousness can develop as a result of certain alterations in body chemistry. The low blood sugar that results from extended fasting facilitates the production of a mystical state in ascetics. An overdose of insulin can have a similar effect. Dehydration, various hormonal disturbances, hyperventilation, and sleep deprivation can also contribute to the creation of an altered state. Particularly important, from our point of view, is the fact that the use of potent pharmacologic agents can produce similar effects. The object of this book is to review the nature of these drugs and their effects on consciousness.

THE ALTERED STATE OF CONSCIOUSNESS

It is quite clear that regardless of how the function of the mind is altered the results are remarkably similar. Thinking is disordered, with changes in judgment and in the perception of reality. There are disturbances of time sense, loss of emotional control, and changes in emotional expression; there are alterations in body image and various other perceptual disorders including hallucinations and illusions, changes in the meaning and significance of words and gestures and objects, and hypersuggestibility. Finally, a very common experience in the transcendental or mystical state is an overwhelming sense of the ineffable, a sense of having had an experience that cannot be described in words.

It should not be hard to see that for man in a primitive state such alterations in the mind would be awe-inspiring and highly valued. Thus it was that a selected priest would undertake to reach beyond his own mind and that of his people in his attempt to communicate with the vast consciousness of the gods. In so doing he would seem to be entranced, not by the means of his transformation, but by the enchanting spirit of the god himself.

THE USE OF INTOXICATING DRUGS

In nearly every part of the world plants were found that yielded psychoactive chemicals—inebriating drugs that could produce the altered state of consciousness. Once found, these chemicals were used by medicine men to facilitate their flights into divine communion. Sometimes the people themselves might be given the drug in the interest of medicine or religion. Suggestibility, emotional catharsis, and intense feelings of rejuvenation would all tend to reinforce other procedures undertaken to cure sufferers or to maintain the devotion of worshippers.

The technique of using drugs could be easily learned and the rewards were sudden and impressive. The cult would be honored and emphasized, and there would be a renewed dedication to the causes of the gods. The drug experience would cause a reaffirmation of the values of the society even among those who were ignorant of the mysteries of the sacred cult.

In some cases the whole community might gather for the sake of ritually consuming the divine plant. Holy men would serve as interpreters and guides; but in the course of the ceremony the whole population would be sanctified.

Since man suffers and has always suffered from pain both physical and mental, it was inevitable that mind-altering drugs would escape from the close control of religious ceremony. In most cases a particular drug entered secular parts of the same culture in which its use first developed. Drugs were used in medicine, and medicine cautiously drew away from its religious origins. They were used in the practice of war and, eventually, of sports. They were also used in the interests of recreation.

However, it is the use of intoxicating substances in the service of religion that must concern us first, and in these first chapters I shall refer to a number of societies in which potent mind-altering drugs have been used in this way.

2.

Kava Kava in Polynesia

Near the village of Fitiuta there is a place where the rising sun is first seen in Samoa. For a long time it was the custom on one day of the year to sacrifice a girl to the sun at this place. On one of these occasions the sun arrived and saw that the girl Ui was very beautiful. Instead of eating her, he decided to take her as his wife. He took her away with him to the sky. When she became pregnant she asked the god if she could return home to her village. He agreed but on the journey Ui had a miscarriage and the fetus floated away on the waters where it was found by the shrike, the plover, and the hermit crab. These animals breathed into the fetus and caused it to live. And it became the first Samoan chief, Tagaloa Ui.

Tagaloa Ui began to walk toward the village of Fitiuta and on the way came upon the house of the mortal, Pava, in a grove of kava plants. The chief and Pava entered the house, and there the first kava ceremony was held. They took very particular places and began to prepare the kava drink. Pava chewed the kava eaf and spat it into a taro leaf. As this was happening, Pava's son entered the room. Tagaloa Ui told the boy o sit down and be quiet, but the boy paid no attention o him. After sufficient warnings had been given, Tagaloa Ui picked up a coconut frond and cut the son of Pava into two pieces. Pava was very upset and could not drink the prepared kava. At this point the chief nstructed the remaining sons of Pava to go into the mountains to collect various tools and ingredients so hat a new lot of kava could be prepared. When it was eady Tagaloa Ui instructed Pava to bring forward the wo pieces of the irreverent boy. The chief then poured ome of the kava on both pieces of the dead boy and aid, "Soifua," which means *life*. The two pieces of the boy were miraculously joined together and Tagaloa Ui aid, "Do not let children stand and talk while kava s being prepared by the high chiefs, for the things belonging to the high chiefs are sacred."

To this day the kava ceremonies on many islands of he South Pacific make reference to most of the acts escribed in this ancient tale. The seating arrangement is very rigid. Children and unauthorized persons re prohibited. The atmosphere is very solemn. Particular instruments are used to prepare the kava, and the whole procedure is carried out according to strict ritual laws. Hands are clapped when the drink is ready, and the word *Soifua* is uttered as a bit of kava is poured onto the mat.

FROM KAVA TO CARGO CULT

Kava kava is a mild euphoriant and inebriant. It is prepared from the root of the pepper plant, *Piper methysticum*, varieties of which occur throughout the Pacific. Although in recent years kava has nearly disappeared from these islands, Hawaii and Tahiti both had the drink at one time. Kava drinking is still quite important on many islands throughout Oceania, and the practice is very ancient. However, the West did not learn about it until the voyages of Captain James Cook in 1768.

Travellers who came to the islands in the years following Cook's visit reported that kava caused some degree of muscle relaxation and euphoria. Eventually, when Western technology and religion began their inexorable struggle against the pre-existing Polynesian culture, it was observed, especially by missionaries, that the drinking of kava was associated with the practice of certain pagan religious rites, and stories began to circulate that kava drinking caused scaliness, blindness, and madness. Systematic efforts were made to stamp out its use. On many islands the missionaries were successful and the traditional Western drink, alcohol, was substituted in the practice of religious rites. Kava had been deeply acculturated over many centuries; but distilled quor was new and mysterious and its use was re-ricted by no cultural controls whatever.

It is interesting to note that the missionaries were so very much alarmed by the ancient Polynesian sport surfing. The good men of the church observed that e Polynesians gambled at surfing contests. They also inted out that men and women bathed together, and at neither sex was modestly attired. Finally, they ncluded that surfing was a waste of time. By the nine-enth century this famous Polynesian sport had clined to the point of extinction.

As Western methods, machinery, and modes of ought spread throughout Polynesia, there was a arked decline in the influence of traditional practices d beliefs. There was, accordingly, much entirely pre-ctable turmoil and discontent. Any society in a state rapid transition from the primitive to the techno-gical is in dire need of certain basic stabilizing influ-ces. In Polynesia the kava ceremony had been the sential source of structure and stability. It has been id that the Polynesians worshipped not so much their ds as their families and their society, and the struc-re of that society had been constantly reinforced by e kava ceremony. Who should take the various roles the preparation of the kava, and the strict order of inking, were all clearly defined. Every person was nstantly reassured as to his exact position in the ciety by his repeated participation in such ceremonies.

To abolish the drinking of kava was, in effect, to dermine the very structure of Polynesian society. The sult was confusion and uncertainty. It is true that in me places the drinking of kava persisted within an ered, semi-Christian type of ceremony. However, in most places kava drinking disappeared entirely and this was certainly one of the causes of the progressive weakening of Polynesian society.

The Polynesians experienced much difficulty in adapting to Western technology and religion. One of the consequences of this was the appearance on many islands of the tragic millennial phenomenon known as the cargo cult. This reaction of a bewildered people against the incursions of technological culture was characterized by a desire to return to the old ways and an illogical belief that a great cargo of trade goods would miraculously appear on the beaches.

In Polynesia a remarkably stable kava culture had persisted probably for thousands of years. Within a century after the voyages of Captain Cook nearly every element of that culture had disintegrated against the vastly more complex and aggressive culture of the West. Today only isolated vestiges of Polynesian culture remain, but in many places the worship of Tagaloa Ui has returned, the art of surfing has been revived, and the drinking of kava kava has again been honored.

THE APPEAL OF THE IRRATIONAL

The Polynesian experience is, in certain respects, similar to what is now happening within Western society. Some people in our own culture are today reacting in very much the same way as the Polynesians. There is a great questioning of the values and attitudes of Western culture, especially its technological elements. There is increasing rejection of the commercial, exploiting, materialistic way of life. There is repugnance for the largeness and impersonality of cities, governments, churches, and schools. There is a longing for a return to a simpler, more human life style. The accidental and the spontaneous are honored, and the small group is especially admired. There is also, of course, an increasng receptiveness toward the use of drugs that seem to ntensify sensation and emphasize the experience of nner illumination. There seems to be some similarity between the passive and hopeful Polynesian drinking kava and the alienated and naively Utopian smoker of marihuana in Western cities today.

It would seem that people everywhere and in every time have sensed a need to belong to groups small enough to be comprehensible. Moreover, there is a persistent need for some sort of common belief, for ritual, or stimulation of the senses, and for conviction concerning the rightness of a cause. Finally, the irrational s immensely appealing and never more so than when rationality appears to be increasing in influence. Thus here are undeniable similarities between !Kung bushman trance performances, spirit possession in Haiti, the Zar cult in South Iran, and the drug culture in our own complex society.

In his study of Yoruba communities in Nigeria, Raymond Prince makes certain observations that are extremely interesting from this point of view. (5) When n the Yoruba town there is a falling off of interest in he traditional religious practices there is a steady rise n anxiety. Soon there are riots, a high incidence of marriage breakdown, and an increase in the incidence of psychosis. However, a curious self-regulating device gradually comes into operation and the whole network of the Orisha cult is stimulated. The diviners return and are entranced and the gods speak through their mouths. Soon there is a return to the ceremonies and laws of the traditional gods. Social stability is re-established and the cycle begins again.

Wherever there is social disintegration there is crime, mental illness, and widespread discontent. The solution, presumably, is social reintegration, a renewed sense of communality, achieved through having a cause, loyalty to a group and to a leader, and the development of ceremonial practices that excite the emotions and overwhelm the rational mind. It is apparent that social cohesion can be re-established by the use of very diverse techniques. It may be observed, however, that among these the most rapid and efficient depend on the use of psychoactive drugs.

In our society today there is much evidence of disintegration. The causes of this are chiefly the manifold forces which tend to make man insignificant, expendable, and lonely. For those who feel dismayed by this compression and distortion of the ego, life is less than satisfying. Such people long for communion with others and for individual expression. They desire spontaneity, the celebration of the accidental. They want to expand out of themselves into some new state of consciousness.

The point, very clearly, is that at least some of us are not unlike the Yoruba or the Samoans. Today our technology is changing at a rate that exceeds the capacity of many people to adapt. The result is that these people have begun to feel that they live in an imposed culture which is as alien and damaging to them as were airplanes and archbishops to the Polynesians.

This reaction is manifesting itself everywhere in our society. Small groups are emerging whose individual members are actually seeking to achieve the same altered states of consciousness that the use of kava kava confers upon the Polynesians. The primary goals are very often healing and enlightenment, an enhanced sense of being and well-being, and a feeling of place and of belonging. It is therefore quite possible to see a relationship between the Indian in South America drinking ayahuaska, an Ostyak shaman in Siberia entering a trance state through the eating of the fly agaric mushroom, and the university student in North America ritually smoking marihuana in the company of a small group of trusted and like-minded friends. In each of these cases there is a common belief in the restorative value of an altered state of consciousness.

Although the use of intoxicating substances for religious or philosophical reasons is nearly universal, this does not mean that such use is free of risk. In every part of the world, socially sanctioned drugs have tended to escape from ritual control. Such drugs have moved from their original place in religious ritual into other segments of community life, as a result of the discovery that they satisfy a variety of needs. The rate of diffusion of the use of a drug from one category to another (e.g., from religious to recreational) and the capacity of a society to adjust to variations in behavior consequent upon such diffusion will determine, in large part, the degree of social disruption such a change will produce.

3.

Sacred Plants of Mexico

It is a remarkable fact that throughout the whole of his great work, *The History of the Conquest of Mexico*, Prescott does not once mention that the Aztecs knew and used hallucinogenic drugs. He refers to the famous herb gardens, particularly the one at Oaxtepec, and he compliments Toltec medicine and science; but at no time could this New Englander bring himself to announce that the Aztecs used peyotl, the divine messenger (an intoxicating cactus); teonanacatl, God's flesh (the sacred mushroom of Mexico); and ololiuqui, the Mexican morning glory. (6)

The Aztecs were a warlike people, nomadic and brutal, who moved into the valley of Mexico only about wo hundred years before the arrival of the Conquista-ores. They were controlled by the terrible god, Huitzi-opochtli, and under his guidance they conquered the ighly civilized Toltecs. Instead of destroying the high oltec culture with its vast knowledge of herbs and athematics, however, they simply added this culture, ith its powerful god, Quetzalcoatl, to their own. Thus t is that at the time of the conquest Aztec civilization as characterized both by an advanced form of Toltec edicine and by the incredible human sacrifices of the ztecs.

After Cortes and his handful of Spanish adventurers onquered Tenochtitlan in 1519, the systematic destruc-on of Aztec culture was undertaken. The priests and en skilled in every other branch of Aztec culture were illed, the temples were reduced, and as many books nd works of art as could be found were burned, melted, r broken. The zeal of the priests and governors who ved in New Spain after the conquest was extraordi-arily intense, and every vestige of pagan belief and ractice was attacked. With the smashing of the temples nd the termination of the sacrifices to Huitzilopochtli ame the destruction of Toltec wisdom in the arts and ciences. It is interesting to note that in the sixteenth entury the development of Spanish medicine was trikingly inferior to that of Spanish arms. Spanish edical practice was also inferior, in many respects, o that of the Aztecs. (7)

Fortunately a few Spanish priests developed a enuine interest in the culture that was rapidly being ecimated. One of these, Fray Bernardino de Sahagun, earned the Nahuatl language and very carefully com-iled a great work known as *The General History of*

Things of New Spain. Another remarkable man, Francisco Hernandez, physician to Phillip II, collected and described great numbers of plants that he found in the increasingly neglected herb gardens of Mexico.

It is now quite certain that Aztec medicine was practised by two very distinct groups of men — priests, who were devoted to magic and sorcery, and physicians, who worked empirically. We now know also that the several hallucinogenic plants of Mexico were used mostly by the priests. Their patients would be given morning glory seeds or mushrooms containing psilocybin, and their consequent hallucinations would be expected to indicate the nature of the disease and the proper method of treatment. The physicians, on the other hand, cured diseases by means of a vast knowledge of herbs, trees, and roots. They could set bones; they could make incisions, remove diseased parts, and sew people up again. There must have been considerable conflict in Mexico between these two approaches to treatment. When the Spaniards added to this their medical notions of the humors, their excessive dependence on purges and blood-letting, and their belief in the healing power of the relics of a saint, medical controversy in Tenochtitlan must have been fiery indeed. However, this conflict was reduced by the systematic destruction of Mexican culture, and ultimately also by the Holy Inquisition. Before long, any Aztec might be denounced for witchcraft or idolatry. Mexican culture declined; what remained of it went underground.

By 1629, it was reported that the Indians were dying very quickly and that there was a very high incidence of bad health and drunkenness. Chocolatl had been taken from Mexico to Spain; in return, Spain had bestowed distilled alcohol upon the helpless Aztecs.

THE MIND-ALTERING DRUGS OF MEXICO

Although Hernandez described some 3,076 plants, only a few hundred of these can be identified after four hundred years of virtually total neglect. We are aware, however, of the existence of several extremely potent substances that were used and still are used in Mexico.

PEYOTL

When the Conquistadores discovered that the Aztecs were eating the dried heads of a cactus, they were outraged and identified the plant as a diabolic root. (8) The missionaries made every effort to stamp out the use of the cactus in native religious ceremonies and even went so far as to compare the eating of the cactus with cannibalism. The peyotl ritual survived, however, and ultimately spread northward.

TEONANACATL

The conquerors were particularly troubled when they came upon the loathsome practice of mushroom eating amongst the Aztecs. That eating the "flesh of the gods" facilitated an Indian's entry into the spiritual world hardly excused it in the eyes of the fanatical Spaniards. Friar Sahagun, for example, pointed out that the mushrooms were harmful and that they intoxicated like wine. He said further that the Indians who ate the mushrooms saw visions, felt a faintness of heart, and were provoked to lust. There has probably never been a cruder nor more ignorant description of a complex and intensely meaningful human practice ever written; but the Spaniards were not especially noted for their sensitivity to the intricacies of the cultures they ruined.

The zenith of the mushroom cult was probably reached in 1502, when mushrooms were used at the coronation feast of Montezuma. Following the conquest, the cult markedly declined and today survives only in a few remote Mexican villages.

The sacred mushroom of Mexico is *Stropharia mexicana.* This plant contains psilocybin and psilocin. These are complex tryptamines—chemicals that interact with substances normally present in the human brain, in ways that are only partly understood by medical science. It is interesting to note that a number of South American snuffs and drinks also contain variations of dimethyltryptamine or DMT, an hallucinogen which has recently found favor among some drug-users in North America.

OLOLIUQUI

Hernandez observed that the Aztecs used a number of vision-producing substances in the practice of their religion. One of these was contained, he said, in the Mexican morning glory or ololiuqui, and he drew a detailed picture of the plant.

Following the conquest the morning glory cult disappeared completely; for four centuries no sign of it was seen. Learned botanists, on examining the Hernandez manuscript, tended to issue pronouncements to the ffect that Hernandez was confused and that the \ztecs undoubtedly had used various other plants ut certainly not the morning glory. Perhaps, they suggested, Hernandez had been tricked by the Indians in n effort to conceal the real but condemned source of ıeir ecstatic visions.

In 1938, however, Richard Schultes came upon a onvolvulaceous vine with white flowers growing in the ooryard of a curandero (a person learned in the folk eligions) in the hills of Oaxaca. The seeds of this plant, *'ivea corymbosa*, the Mexican morning glory, were sed by the curandero as a divinatory narcotic. In 1960 ıe Swiss chemist Hofmann isolated lysergic acid amide 'om the seeds of this plant. Hernandez was thus proven 440 years later) to be a wise and observant man.

Prior to Schultes' discovery, the amides of lysergic cid and of d-lysergic acid had long been familiar, but nly as occurring in ergot, the fungus that infects rye. 'hese amides are about one tenth as potent as LSD. The ıewing and swallowing of raw seeds containing them ɔmmonly produces nausea, diarrhea, and dizziness. ɔmetimes the seeds are ground and taken with tea, with ıe same sickening effects. In recent years such American domestic varieties as Heavenly Blue and Pearly 'ates have been tried by trip-takers, but the untoward :action is sufficiently powerful and the euphoria or ılse sense of well-being sufficiently slight to prevent ıe practice from becoming very popular.

'ALLUCINOGENS AND SOCIETY

ı considering the chemicals that were used by the .ztecs in the course of their religious ceremonies, it is important to remember that these drugs were acculturated in this society through long use. Their administration was controlled, and their effects were tolerated within the context of the rules of the society. All of these chemicals were capable of causing perceptual distortions, hallucinations, and marked changes in bodily function. But these were understood and were very familiar both to the priests and the people. There is nothing to indicate that uncontrolled or excessive use of these chemicals was permitted, and there is much evidence that the society in which they were used was remarkably productive, highly organized, and unalterably opposed to overt intoxication.

The consequences of the recent revival of interest in these ancient Mexican chemicals are hard to predict. Although the plants have lost none of their potency, traditional restraints on their use have disappeared. Although the altered state of conciouness conferred by psilocybin on the Aztecs might well have been socially adaptive, it does not necessarily follow that the unrestrained use of the drug under very different circumstances in our society would be similarly integrative.

4.

Intoxicating Snuffs and Drinks of South America

ava kava, the drink made from the dried roots of *per methysticum*, is relatively mild. It is used by ople who have gathered together for the completion some co-operative social task; when the ceremony is er, they begin their work. Except where the drink has caped from ritual control into recreational or secular e, drunkenness seems rarely to occur. This Poly- sian situation contrasts strikingly with the use of nd-altering drugs in many parts of Central and South nerica.

Christopher Columbus made his first contact with nerican Indian culture in the West Indies. There he d his men found certain materials with marked mind-altering properties in common use. The Indians were, of course, found to be chewing tobacco, using it in a powdered form as snuff, and smoking it in large cigars. Apparently, also, *coca* leaves were mixed with tobacco ashes and chewed much as tobacco was. While the particular Indian groups first observed by the Spanish have become culturally if not racially extinct, Indians in the highlands of Peru still chew *coca* leaves in the ancient way.

It is even more interesting that throughout Central and South America a great number of other plants had been found by the Indians to yield potent psychoactive substances. Columbus and the conquerors who followed him found the Indians using snuff made from plants of the genuses *Virola* and *Anadenanthera* (*Piptadenia*). In various parts of that vast region these intoxicating snuffs are called parica, cohoba, and yakee. For some time it was believed that their active ingredient was myristicin, the chemical that occurs in the nutmeg tree on the island of Banda in the Indian Archipelago. It has been known for centuries that the eating of nutmeg and mace can produce hallucinations and other distortions of perception. However, very recently it has been discovered that *Virola calophylla* and *Piptadenia peregrina* also contain a number of tryptamines (chemicals that are present in many of today's more readily available hallucinogens).

RELIGIOUS USE OF SNUFF

Anthropological studies have revealed that many isolated Indian groups throughout South America, particularly those in the valleys of the Orinoco and the

Amazon, have used and continue to use these powerful nuffs in religious ceremonies. Throughout these regions he snuff is generally put into a Y-shaped tube. One arm of the Y is inserted into the mouth and the other into he nostril. In this way the parica or cohoba can be elf-administered. In some groups, however, the snuff s put into a tube several feet long. One end of the tube s held in the nostril of one man while another man blows vigorously into the other end of the tube.

Since the goal of snuffing is the achievement of a ranscendental state, the powder is considered a magical means of entering into a special world. It is not surprising, therefore, that the paraphernalia used for snuffing is ornamented with figures depicting the gods: usually the ube is decorated with jaguars, because the jaguar is onsidered to be the earthly form of a god. Indeed, in many areas the shaman wears a jaguar headdress as he nuffs and subsequently walks on all fours. Once having reached the transcendental state, he can divine the ature of a sick man's ills and can come to know the urther course of the life of the supplicant. The jaguar s the South American werewolf, and sometimes older hamans are felt to be jaguars in human form. If a jaguar should attack a person, the shaman (who is both ealer and sorcerer) is sometimes put to death. This ction seems rather futile, however, since the spirit of he murdered shaman will merely come to rest in another man-killing jaguar. (9)

Other animals commonly depicted on snuffing instruments are birds with extremely good eyesight such as ultures, eagles, and condors. Sometimes the shamans wear feather crowns to facilitate their entry into the world of the high-flying spirits. The reason for this is that the intoxicated state is seen as magical and all-seeing. Indeed, the shamans assume certain powers ordinarily held to be characteristic of the gods. (It is interesting also to note that eaters of the fly agaric mushroom in Siberia feel that they can fly high after they have partaken of the mushroom.)

In any case, it was always the duty of the shaman or other chosen tribal functionary to encourage the gods considered to be benevolent and to weaken or destroy, if possible, the influence of the malignant ones. No man could presume to deal face to face with such exalted spirits without the extraordinary alteration of mood and thought conferred by the taking of parica. Thus the use of mind-altering drugs in religion was, and still is, a most important element in South American Indian culture.

INTOXICATING DRINKS

We now know that throughout the Middle Ages, Europeans used the seeds of the plant *Peganum harmala* both as a spice and as an intoxicant. This plant is said to be a native of Russian Turkestan and Syria. At present, its seeds may be purchased in bazaars in India. It was taken by the Arabs to Spain, and to this day the plant may be found growing wild in certain parts of that country. In light of the rapid spread in recent years of the use of marihuana, it is very interesting that seeds containing such potent chemicals as harmaline and harmine should not have continued in regular and increasing use in Western Europe.

Another plant containing these same alkaloids is a vine called *Banisteriopsis caapi*, which grows between he rain forests of the Amazon and the Andes. In this egion, remote tribes of Indians make highly intoxicatng drinks from this vine. These drinks are called caapi, age, and ayahuaska, and all contain harmaline, a arkedly hallucinogenic variant of the tryptamines hose effects differ somewhat, however, from those of escaline (a peyotl derivative) or LSD. Physical senations are typically more marked. There is loss of ensation in the feet, head, and face. On the other hand, istortions of body image are quite rare. Marked disrtions of external forms or faces do not occur. With armaline, the environment or background remains ssentially unchanged. However, imaginary scenes are equently superimposed on it. One subject reportedly atched a cat walking around a room and climbing onto mething. The cat gradually turned into a leopard. nterestingly, of course, there was no cat in the room begin with.

With eyes closed, the harmaline user generally xperiences a highly colored world. Even with the eyes pen, he may see fascinating sights. Long dreamlike equences commonly occur. In contrast with mescaline, hich may produce profound changes in feeling and ought, harmaline use is seldom characterized by hilosophical rumination. Transcendental experiences ppear to be far less common. Often the user simply emains fascinated by extraordinary images.

That harmaline is more of a pure hallucinogen than escaline is confirmed by Indian shamans who drink yahuaska for the purpose of divination. The imagery is ery vivid, there is a curious persistence of after-image, nd contours appear to be especially well marked. It would seem that harmaline has a particularly stimulating effect on the retina.

LETHARGY AND MACROPSIA

In remote South American villages, yage dreaming is traditional behavior. The yage drinker becomes lethargic and immobile. He lies with closed eyes and seems to withdraw from reality. At the same time, he remains especially alert to the peculiar mental images and fantasies that constantly rush before his mind. (10)

This is quite unlike the extraordinary effect of such a snuff as epena, the material prepared from a small plant in the genus *Virola.* (11) Within two minutes of inhaling a dose of epena, the Indians sway as though drunk. Their stares become fixed, and they perspire copiously. They then begin a monotonous dance, emitting terrible yells every five minutes for no reason that is immediately apparent. They then stretch as tall as possible in an effort to reach the height of the neighboring mountains and talk to the gods resident there.

It is of particular interest that on becoming intoxicated the Waika Indians experience a condition known as macropsia. In this state they imagine that they are enormously tall, and they dance as giants in a world populated by giants. They speak of seeing angels in the mountaintops, and they see the Hakula spirits — gigantic, god-like people who also reside there. Apparently the Indians converse with these powerful spirits and learn from them how to cure sickness and how to cceed in hunting. After an hour an Indian goes to his t, lies down, and falls asleep.

The vigorous physical activity typical of the epena remony is clearly related to what is called sensory erstimulation. The combination of such sensory mbardment with the effects of hallucinogenic snuff sults in marked alteration of consciousness. On other hand, the Indian using the harmaline drink, ahuaska, characteristically becomes passive and withawn. Here the effect of the drug is reinforced by great inution of external or physical stimuli. The result, either case, is a state of mind that facilitates mystical perience.

5.

North American Indian Intoxicants

It would seem that the Americas have been far more richly supplied with narcotic and stimulant drugs than the rest of the world. Central and South America, in particular, produce an abundance of psychoactive plants. In the immense region north of Mexico, the Indians used peyotl, tobacco, jimson weed, and a variety of alcoholic beverages. (12) All of these drugs were used as medicines, as religious inebriants, and ultimately as sources of pleasure.

TOBACCO

Christopher Columbus had observed people on Hispaniola and Cuba smoking cigars. To Europeans this 'as an entirely novel practice, but it was already a very ncient one within Amerindian culture. There are peraps twelve species in the genus *Nicotiana*, but the preursors of the hybrid *Nicotiniana tabacum*, a comparavely mild tobacco, probably originated in the region :retching from Peru to northern Argentina. Following s prehistoric discovery, the use of tobacco spread down ıe Amazon to the Atlantic and to the West Indies, 'here Columbus made his observations.

Nicotiniana rustica, another form of tobacco, is also hybrid — a plant derived from two earlier species. 'his plant spread far more widely and was eventually ultivated throughout most of South America, all of 'entral America, western Mexico, the eastern half of ıe United States, and throughout large areas in the astern provinces of Canada. Indeed, the distribution f this plant is nearly identical to that of maize: rchaeologists have almost invariably discovered ›bacco pipes alongside the earliest indications of maize griculture. Eventually the British brought the milder *'icotiniana tabacum* from the West Indies to Virginia nd there it quickly superseded *Nicotiniana rustica*. A umber of other tobaccos were grown locally in North ımerica, particularly by Indians of the western region.

Though the eastern Indians also grew maize, beans, ourds, and sunflowers, tobacco was probably the most 'idely cultivated crop in precolonial North America. n the northwest it was mixed with lime and chewed. In 'alifornia it was sometimes mixed with an infusion of *'atura* (a powerful hallucinogen) and drunk. In the ast it was smoked along with sumac leaves and the ıner bark of the dogwood. Snuffing was common only ı the Caribbean. The *Nicotiniana tabacum* of that region originated from an area in which other drugs were commonly snuffed, especially the potent alkaloid *Piptadinia peregrina*, and it is possible that Columbus' initial contact was with Indians who were not snuffers of pure tobacco. Though chewing and snuffing were probably the earliest forms in which tobacco was used, the smoking of cigars or cigarettes finally became the preferred practice in most regions.

The Amerindian use of tobacco is quite similar to the Polynesian use of kava kava. Every public ceremony, including funerals, puberty rites, harvest festivals, peace-making gatherings, and preparations for war, involved ritual use of the pipe. Tobacco was often ceremonially buried at such times, and it was commonly burned as incense. Should an agreement reached in the course of a tobacco ceremony be breached, it was believed that the defaulter would be punished by some offended god. There is no doubt that tobacco was a sacred plant and that it was indispensable in the performance of a great variety of religious rites.

JIMSON WEED

Datura stramonium, or jimson weed, contains scopolamine. The powerful effects of this drug and of other belladonna alkaloids will be discussed in a later chapter. The thorn apple or jimson weed is native to the southwestern United States and to a few isolated regions of Mexico and Central America. The Aztecs called it toloatzin; the English name is derived from the curious fact that in the late seventeenth century a group of soldiers at Jamestown, Virginia, cooked and ate the eaves of the plant and were greatly startled by the ntoxication that followed. Jimson is merely a corruption of Jamestown. The fact that these soldiers found he weed in Virginia attests to the wide distribution this plant eventually achieved.

In California, a large number of tribes had used the plant for centuries. The visions and dreams that the drug engendered were used to facilitate divination. Complex rituals developed around the taking of *Datura*, and in many localities religious practices were based on community use of the drug. One form of puberty rite, for example, involved the drinking of *Datura* by all the participants. It was believed that *Datura* was bestowed on worshippers by the gods; and ince the gods controlled the elements, this sacred plant was used in rain ceremonies, in rituals preceding the hunt, and in the course of preparations for war. The Aztecs also regarded the plant as sacred, and in their mpire the priests commonly took *Datura*, often mixed with peyotl, during their investigations into the sources of disruptive witchcraft. In general, though, the easterly pread of *Datura* was effectively checked by the secure stablishment of peyotl cults in what is now the Mexican tate of Sonora and in New Mexico. In these adjacent egions, loyalty to jimson weed in the west and to peyotl n the east was intense, and the alien drug was in each ase looked upon with contempt and suspicion.

THE MESCAL BEAN

n western Texas and southern New Mexico, the mescal bean derived from the plant *Sophora secundiflora* was in common use. This bean contains the alkaloid sopharine. Its intense nicotinic effect produces nausea and sometimes convulsions on ingestion. Death through asphyxiation is the occasional result of eating this plant. Perhaps because of the shocking effects of this drug, the mescal bean cult failed to spread, and in many areas the poisonous bean was simply worn as a charm. It is not surprising that peyotl swept successfully through the mescal bean territory.

THE BLACK DRINK

The famous black drink was used over a large area of the southeast. This preparation was composed of the leaves of the tree *Ilex cassini,* often mixed with tobacco. The effect was sudden vomiting. Probably there was no central nervous system stimulation whatever. The ceremonial use of the black drink by the Creek Indians and other eastern tribes for the purpose of violent purification is reminiscent of the old European conviction that disease can be cured by such cleansing procedures as purgation and emesis. The Indians tended to drink this raw concoction before important meetings and many religious ceremonies. Freed in this way of impurities, they felt they would be more single minded in conducting their affairs.

PEYOTL

The curious cactus *Lophophora williamsii* is spineless and grows mostly underground. It yields nine alkaloids, including the celebrated hallucinogen mescaline. The plant grows in the Rio Grande Valley and has been used ceremonially for centuries. Today, collectors prepare for a cactus finding expedition several weeks in advance by fasting and abstaining from sexual intercourse. When they reach the plant they shoot arrows to the right and to the left to ward off evil spirits before digging the cactus out of the ground. The plant is cut into large slices and left to dry in the sun. The result is the famous mescal button.

In Mexico the Indians, including the Aztecs, also drank a concoction containing peyotl and sometimes alcohol. However, there were significant differences between the rites of the Mexican Indians and the Plains Indians. On the Plains, the peyotl ceremony began as a preparation for war and the rite was usually restricted to small groups of men. A hide-covered kettle drum was beaten, but there was no dancing. In Mexico the whole community, men and women, might participate in the religious ceremony; there was much dancing, and the essential purpose of the celebration was to allay anxiety and promote the falling of rain. In both regions, however, the expedition to the peyotl country was controlled by ritual, the peyotl fetish was treated with utmost reverence, incense was burned, tobacco was smoked, and there was much singing. In both regions, also, sins were confessed and cures were sought in the course of the ritual intoxication.

On eating peyotl, the user would be rewarded with a number of remarkable alterations in perception. Exhilaration, euphoria, feelings of strength, and hallucinations (usually visual) would occur. Because the American Indian has tended to be awed by dreams, it is not surprising that the visions induced by peyotl would find a place in his system of religion.

Chemically, mescaline is 3, 4, 5, trimethoxyphenylethylamine. Three hundred milligrams of this drug will produce hallucinations, perceptual distortions, and euphoria. The raw cactus is known as peyotl, hikuli, or seni, and by several other names as well. Because this material has a bitter, unpleasant taste, it is usually taken with tea, coffee, or milk. The effect is marked stimulation of the visual and visuo-psychic areas of the brain. Flashing lights and vivid forms appear before the eyes, and very bizarre color perception is common. These effects persist for up to twelve hours.

In historical times, the peyotl ritual spread to the Apaches, the Omahas, the Comanches, and other tribes; today it is practised by Indian members of the Native American Church from Sonora to Saskatchewan. Because Christian groups have viewed the ceremony as pagan and therefore undesirable, numerous attempts have been made to suppress the use of the cactus. However, the question has been tested in a number of jurisdictions, and today a bona fide member of the Native American Church may freely use the peyotl cactus as a sacrament in his religious services. In the United States the peyotl service frequently incorporates Christian symbolism and ritual, but the sacred cactus remains the crucial sacrament.

The cult reached the Apaches toward the close of the eighteenth century. By 1900 it had spread to the southern Plains tribes, by 1936 to the Crees of Canada, and by the 1950's to other Canadian tribes. Although there is no doubt of the immense appeal of the drug for the Plains Indians, the use of peyotl at no time made

ny headway among the Pueblos of the southwest. The
xplanation for this may well lie in the fact that although
he Pueblos were undoubtedly handled very shabbily
y arrogant white settlers and railroad builders, their
ssentially agricultural way of life did not suffer irrepar-
ble damage. The Plains Indians, on the other hand,
uffered in the most atrocious fashion as white settle-
nent advanced. The buffalo were systematically killed,
he ranges were fenced, and such European diseases
s tuberculosis and smallpox raged among the Indians.
he result was that the indigenous people were utterly
emoralized.

The native religion on the Plains was based on the
ndividual vision quest, and any man who could experi-
nce hallucinations was held to be a prophet. When,
fter 1890, the extraordinary phenomenon known as the
host dance had begun to disappear, the way was clear
or the spread of the peyotl cult. In the 'twenties the
Native American Church was formed, and it was estab-
shed that the peyotl cactus could be used as a sacra-
nent of that religion.

The analogy between the ghost dance movement
f the Plains and the cargo cults of Polynesia is
triking. In the former the Indians believed that the
uffalo would miraculously return and that the white
nen would vanish from the Plains. The old ways of the
ndian would be revived and there would be unending
ontent. The members of this cult were doomed to utter
isillusionment; the last manifestation of the movement
vas the disastrous uprising led by Sitting Bull in the late
ineteenth century. Following the complete collapse of
nese Utopian dreams, the Plains Indians became
xtremely receptive to the itinerant chiefs who offered

them consolation and tranquillity through the use of peyotl.

The spread of the peyotl cult and the resurgence of interest in the drinking of kava kava in Oceania may also be compared in certain respects. In both cases we can clearly discern a strong reaction against a powerful and prevailing culture that is alien and hostile to the indigenous one. Modern technological culture is being resisted in many parts of the world by a renewed interest in drugs that promote individual experience within small social groups. The marked desire of the Plains Indians to incorporate peyotl into their culture may also, in many respects, be seen as comparable to the recent spread of marihuana in our own society.

ALCOHOL USE AMONG AMERICAN INDIANS

The Indians of Mexico made alcoholic beverages from an astonishing variety of plant and animal materials. Balche made from fermented honey was commonly used by the Mayans. The sap of the wine palm was used in many parts of the Aztec empire. Plums, sarsaparilla roots, and pineapple were all used in the making of alcoholic drinks. Probably the most useful plant of all was the maguey. From this the Indians made thatching material, sandals, rope, and cloth. The plant was also used for fuel, to make needles and, perhaps most importantly, as the source of the famous beverage known as pulque. (13)

Some old legends hold that pulque was invented near the village of Tepoztlan, south of Mexico City. In any case, this village became the site of a great cult of metochtli, the god of pulque. This god and the drink e ennobled were famous throughout the Aztec empire, nd Tepoztlan became an important religious shrine. lthough most authorities agree that in the Aztec omain drunkenness was severely punished, it would eem that at Tepoztlan debauchery was common, at east before the region came under the influence of he Aztecs.

Throughout this region the dreams and visions eported by the inebriates were held to be of the greatest ignificance. Although the beverages prepared from uch sources as agave (maguey) and dasylirion (sotol) ontained only 3 or 4 per cent alcohol, drunkenness ust have been a socially disruptive element. The ztecs attempted to control this source of danger by pecifically forbidding students, nobles, and priests to et drunk, on pain of death. A commoner would be eaten for a first offence and killed if found drunk gain.

The distribution of alcohol-drinking tribes is quite emarkable. The expected relationship between agricul- ure and alcohol use is apparent; but whereas the spread f nicotine corresponded precisely with the diffusion f maize agriculture, the relationship of fermented bev- rages and the related forms of agriculture is not so efinite. Alcohol use was common throughout Central merica and the Caribbean. It extended through exico and into western Texas, New Mexico, and outhern Arizona. In the rest of the continent there was o knowledge of fermentation, though both maize and obacco spread from the south to cover the entire con- nent. A few southeastern tribes are the only exception. ndians of Virginia made a wine from wild persimmon.

All other information regarding the Amerindian use of alcohol derives from the period after the advent of Europeans.

The aboriginal use of alcohol was remarkably limited, at least in terms of range. On the other hand, when alcohol was used it was an important element in the culture. In the southern regions, alcohol drinking was clearly an important aspect of religious life. In the north, its use was much more secular or recreational. Wines were made from the fruit of such cacti as the saguaro; maize beer was made from corn; cornstalk wine was also made. A liquor was made from tapioca in the Caribbean, where the manioc plant was a staple food.

DISTILLED BEVERAGES

Although the Aztecs were familiar with many weak alcoholic beverages, the distillation of alcohol was unknown among them before the conquest, and the effect of the distilled beverages brought by the Spaniards was to accelerate the collapse of a tottering society. Throughout most of North America, alcohol of any kind had been utterly unknown. In this huge region, particularly in the northeastern part, alcohol became a strong and relentlessly injurious element in the lives of both the Indians and the whites.

As the French advanced, they traded many different commodities for furs. One of these was brandy. As the English and Dutch advanced, they competed with the French, rewarding the Indians with rum from the West Indies. The Indians accepted distilled liquors because they reinforced a cultural pattern — reliance on dream experiences for guidance — that had prevailed for centuries among them. Through fasting and physical deprivation Indians were capable of achieving what was described in Chapter I as the altered state of consciousness. In this condition visions indicative of the future, of the identity of enemies, and of the nature of disease would be seen, and answers to imponderable questions would be given. The celebration known as Ononhouaroia (the upsetting of the brain) was common. In this, large groups of people would lose control over their mental processes and would rush about obeying capricious commands received in dreams. This state of transcendence was earnestly desired, and it was a fundamental aspect of the Indian spiritual experience. A person in the grip of such an uncontrolled state of mind was regarded as supernatural, and whatever action he engaged in was condoned on these grounds.

Such temporary states of mental aberration were traditionally achieved without the use of any intoxicating chemical whatever. Then the white man brought a magic liquid that could create the wild intoxicated state without any effort beyond the mere act of drinking. Moreover, the Indians, existing on the edge of hunger and constantly threatened by hazards both human and elemental, had typically adapted to a pattern of prolonged deprivation and sudden abundance. When they had food, they would feast ravenously until the food was entirely consumed. Their approach to alcohol was similar and the result, of course, was extreme drunkenness.

The Indians believed that murder and other crimes committed while in a state of aberration or intoxication were pardonable. The drinker was not responsible for his actions because he was under the control of supernatural powers. The French and the English officially deplored this state of affairs and duly hanged a certain number of Indians. The exigencies of trade, however, caused them to continue to supply the Indians with alcohol. Eventually, the Indians asked the white men to desist and thus passed the responsibility to them. The whites concluded that the Indians were weak-minded since they desired to be free of alcohol yet continued to accept it. The Indians, for their part, felt that white men were dishonorable because they were not guided by the ancient Indian concept of trust. If alcohol was offered, it would be accepted; therefore it should not be offered.

The white men were guided fundamentally by the law of supply and demand. If they recognized that the use of alcohol was causing squaws and children to go hungry and the stability of Indian society to be damaged, perhaps they also saw an advantage to themselves in the fact that the Indians were becoming progressively more dependent on them through the accumulation of debt. The Indian who got into debt through the purchase of alcohol could satisfy this debt by the gathering of additional furs. When a further transaction resulted in some profit for the Indian, he could buy more alcohol and thus get back into debt. Alcohol was a crucial factor in the decline of Amerindian society.

6.

Divine Drugs of Western Culture

is extremely difficult to trace the origin of the use f beverage alcohol in Western culture. In the Neolithic eriod the fermentation of cereals was certainly known nd stone age beer jugs have been found. (14) It is also nown that there were taverns in Mesopotamian cities about 2,000 B.C. On top of an artificial hill known s a ziggurat the shrine of the city god would be built. ives of the god would take turns spending the night ere. These women, known as Sal-me, lived in the mple grounds, but they were free to visit the city, aintain houses there, and even engage in business. owever, there was one business in which they could take no part. Hammurabi's code specified that any Sal-me found operating a tavern was to be burned.

It has often been reported that Noah had some knowledge, perhaps too much knowledge, of wine. In Genesis, Noah " . . . began to be an husbandman and planted a vineyard. And he drank of the wine and was drunken; and he was uncovered within his tent." Interestingly, Noah's sons were very much ashamed and covered their father's nakedness in such a manner as to protect themselves from further observation of the undraped toper. In spite of his shamelessness, however, Noah was said to have lived 950 years.

JEWISH AND CHRISTIAN USE

That wine was considered to be of special significance among the Hebrews is suggested by reference to certain instructions given to Moses. In the book of Numbers, the Lord spake unto Moses and said, "When either man or woman shall separate themselves to vow a vow of a Nazarite he shall separate himself from wine and strong drink, and shall drink no vinegar of wine, or vinegar of strong drink, neither shall he drink any liquor of grapes, nor eat moist grapes, or dried." In Exodus, worshippers were instructed as to the proper method of sacrificing lambs. "And with the one lamb a tenth hin of flour mingled with the fourth part of an hin of beaten oil; and the fourth part of an hin of wine as a drink offering."

The sacrifice of the lamb can be traced backward in time to an earlier period in which humans were the sacrificial victims. Eventually, the wine itself came to symbolize the sacrifice of the animal and therefore of the old king or the man-god of antiquity. There is no doubt that the doctrine of transubstantiation, in which the wine becomes the blood of the son of God, can be traced to earlier practices in which the sacrificial victim was killed in the course of the ceremony. In short, the ritual use of wine is exceedingly ancient in Western culture and this use persists to the present time in Christian and Jewish ceremonies.

For the most part this ceremonial use of wine was very carefully controlled, and drunkenness was not commonly used as an approach to the mystical state. Nevertheless, a great profusion of secret cults developed and disappeared around the shores of the Mediterranean, and in some of these alcohol and other drugs were undoubtedly used in precisely this way.

The mysteries of Eleusis involved purifying rites in which the supplicant would be bathed in the blood of a pig and baptized in the sea. He would probably also be given some powerful emetic such as hellebore. In the frightened and fatigued condition thus produced, he would be highly receptive to belief in the mysteries. It is said that when initiates gathered in a subterranean labyrinth at Eleusis they drank narcotic beverages that induced hallucinations. It is quite likely that these concoctions contained belladonna alkaloids, including atropine. Eventually the people of the eastern Mediterranean became familiar with hashish, and this drug may also have been used ceremonially in that region. The part that opium has played in Western religion is quite unclear, but it has probably not been a great one.

Ecstasy through intoxication was at one time an essential element in the religions of the Greeks, of the peoples of the Middle East, of the Aryan conquerors of India, and of the northern European Celts and Teutons. Northern and Western religious systems evolved from these ancient sources, but in the process of their development self-transcendence through intoxication in religious settings was de-emphasized. Thus it is that Christianity appears to be relatively free of drugs except for the persistence of certain symbolic vestiges.

DRUGS IN SECULAR LIFE

Christianity certainly produced an abundance of saints, and mysticism was by no means confined to the oriental religions; but Westerners have tended to rely on fasting, dehydration, scourging, physical fatigue, and long vigils of immobile silence for the achievement of mystical union with God. Nevertheless, it is quite clear that the urge to self-transcendence through the use of drugs did not disappear in Christian Europe; it simply became secular.

Although Western religious bodies withdrew approval from the drunken approach to God, the use of ale and mead and beer did not diminish. Indeed, medieval Europeans probably drank more alcohol than their present-day descendants, with the possible exception of the French. Medieval man was dissatisfied with his limited self and his limiting society; he, too, sought release. Like people in every other part of the world, the people of medieval Europe searched for self-transcendence — though not, presumably, in a strictly religious sense. Religion brought them to God; alcohol dissolved the insulation that encased their lives and allowed them to feel briefly different and free. Such freedom, after all, is also self-transcendence; and divine beer, although unidentified as such and unsanctified, was the valued agent of freedom.

All that had changed, essentially, was the context. It was no longer a religious one. The process through which tired, frightened, or bored people could depart at least briefly from their ordinary modes of thought remained the same. But where the drug of choice was alcohol, there was a further departure from the common Eastern pattern. Alcohol characteristically depresses the higher centres of the brain and causes degrees of disinhibition that are altogether unsuited to meditation. Self-transcendence with alcohol comes as a result of shutting off the awareness of one's usual consciousness rather than as a result of increased awareness of novel sensory impressions.

CULTURE AND DRUG PREFERENCE

Until very recent times, no meditative chemical has made any headway at all in Western society. Although the West first learned about marihuana at the time of the first Crusade, it was used only occasionally thereafter and by isolated groups of people. Literary figures occasionally reported fascinating experiences with the drug, but this had no impact whatever on the rest of the people. Marihuana was of no interest to seekers after joy or to the godly in the West, though people with similar desires were regularly being transported by the drug in other parts of the world. It would seem that Western culture was too outgoing, too materialistic, too active to welcome a drug that facilitated the enjoyment of inner experience. Experience, for the West, was of the world, and the world was dazzling and infinitely stimulating in its complexity. When the Westerner felt the need for psychic change, he tended to think in terms of stopping the flow of sensory stimuli. He drank beer and, later, whisky and rum. He had no need to make his world more varied, because he already perceived it in overwhelming detail.

Later, when Western sailors and conquerors visited every part of the world, the plants that were of interest to them were the ones for which they could see some practical use. The Conquistadores brought back potatoes and squashes from Mexico; the flesh of the gods they left in the New World. Indeed, the adventurers and missionaries were everywhere offended by the drug use they saw. The Polynesians were advised that the drinking of kava kava would cause them to go mad. Aztec use of the peyotl cactus was held to be pagan and unspeakable. There were, of course, a few exceptions. Europeans accepted tobacco from the Indians, and the drinking of chocolatl also became very fashionable; but these drugs found no place in the religious ceremonies of the West. Indeed, it was not until the middle of the twentieth century that hallucinogenic and illusionogenic drugs began to create in the Western mind that ecstasy and sense of oneness with all nature that people in other parts of the world had been experiencing for many centuries. One drug, in particular, has recently achieved an important place for tself in the history of mysticism. This is lysergic acid diethylamide (LSD).

LYSERGIDE MYSTICISM

Though LSD was discovered to be an hallucinogen as late as 1943, man had had a long and troubling association with the ergot alkaloids from which it is synthesized. Ergot is derived from the fungus *Claviceps purpurea* that grows on many grasses, especially rye. The fungus commonly occurs during moist weather; ts spores are carried to the ovaries of the rye by wind and insects. Here the spores germinate and destroy the tissue, and a yellow viscid substance called honeydew s exuded. This attracts insects which in turn spread he fungus to other spikes of the cereal. Finally, with further growth, the grain of rye is entirely replaced with a purple bead known as the sclerotium, or the ergot of rye.

Ergotized rye is extremely toxic; there has been much chronic morbidity for many centuries, especially among he peasants of Spain and Russia where a great deal of rye was grown. In France major epidemics of ergotism occurred in 944 and 1000, and the disease became known as St. Anthony's Fire because victims were encouraged to pray for relief to St. Anthony and because heir limbs became dark from gangrene, as though they had been burned. Convulsions and excruciating pain were other symptoms. An 1805 account said: "Many were tortured and twisted by the contraction of the nerves; others died miserably, their limbs being eaten up by the holy fire and blackened like charcoal." It would seem that ergotism produced the very opposite of the transcendental states of peace and tranquillity that LSD is now reported to create.

Ergot also caused spontaneous abortion, especially in cattle, and because of this much interest was shown in the chemical in the hope that an abortifacient might be developed from it. It was not until 1906 that ergotoxin was isolated. This was followed by ergotamine and, in 1936, by ergonovine. This drug produces prolonged and powerful contractions of the human uterus and was accordingly of great value in obstetrical medicine. That cases of ergotism are rare today is, no doubt, owing to greatly improved agricultural practices and to laws that carefully limit the amount of the contaminating material that may be contained in rye cereal. (15)

The modern version of St. Anthony's Fire began to burn when the search for more effective forms of ergot became very active in the 1930's. Lysergic acid diethylamide was actually synthesized in 1934, but its psychoactive properties were not known at that time. In 1938, Albert Hofmann, working in Basel, synthesized this same material from ergot, but he too failed to come upon its extraordinary mind-altering properties at that time.

In 1943, while continuing the search for drugs that would cause more efficient uterine contractions, Hofmann accidentally ingested a small amount of LSD. Very quickly he experienced a number of curious alterations in perception and realized that these changes must have been produced by one of the drugs with which he had been working that day. As an experiment, he then deliberately ingested a measured amount of

LSD. The remarkable distortion of perception, euphoria, and alterations of feeling and thinking recurred. The lysergide, he concluded, had caused an extraordinary and profound psychosis.

In the first few years following its synthesis, LSD was used by medical people to mimic psychoses in the hope that further light would be shed on the ancient problem of schizophrenia. In the 'fifties, it was used to treat a wide variety of disorders ranging from autism in children to alcoholism. During that decade the information spread that some subjects, having been given the drug in clinical settings, had experienced the transcendental state which had previously been described by the Christian mystics or by practitioners of certain Eastern religions. Thus the drug escaped from the clinics to the streets, and there it joined marihuana in its extraordinary advance into Western culture.

Very soon, rhapsodic accounts began to appear concerning the ability of LSD to facilitate the mystical experience. With devotion to traditional Western methods of worship declining, LSD was welcomed by some as an agent that might reaffirm a belief in God. The rapid appearance of its effects was particularly well suited to the times. Hindu mystics or Buddhist priests would study and meditate for many years before they would even presume to reach toward that blinding, ineffable enlightenment that might be their reward. LSD was used by Westerners to achieve sudden mysticism with no more effort than it took to lift a sugar cube to the mouth. Instead of the wizened sage, it was now the naive youth who might be admitted to the mysteries of the ineluctable and oceanic consciousness.

In parts of the world where powerful psychoactive drugs have been used for centuries, they are ingested in closely defined contexts and surrounded by many ceremonies and rituals. The manner of use is prescribed in detail, and the results consequent upon it are known. Indeed, the suppliant is guided to the achievement of certain goals by long study and by the encouragement and control of shamans, sorcerers, priests, or monks. None of this is the case in Western society. Indeed, one of the most potent drugs ever to appear in the world was suddenly given in the 1950's to a society that had never in its entire history had any common experience with drugs of this type. Western society had been introduced to hashish in 1090, to *coca* in perhaps the sixteenth century, to the anesthetics and mescaline in the nineteenth century, and yet it did not in any of these ages attempt to assimilate these decidedly less potent drugs. Alcohol, supreme and secure, held the field against all the threatened incursions by plant materials from other parts of the world. Even the inexorable advance of the use of peyotl by the American Indians failed to create in the larger population an interest in other means to spiritual enlightenment. However, in the 1950's subjective accounts of the transcendental effects of LSD became commonplace, and thus began a harsh confrontation between the established culture and an insistent new influence.

Pure LSD is a remarkable drug, and its potential for good and evil has by no means been fully explored. That its ingestion can produce a toxic psychosis that resembles schizophrenia in a number of respects is undoubted. Concerning the hypothesis that some of the great mystics of the past (and especially some of the simpler people who had visionary experiences) were schizophrenic, there is also very little question. Of the fact that the progression to the level of mystical consciousness in some users of LSD is an indication of regression rather than enlightenment there is also, regrettably, very little remaining doubt.

THE ESTHETIC CONSCIOUSNESS

In the early hours of an LSD trip a certain heightened self-centredness occurs. The subject senses a curious apartness from the people and the things of the world. A certain dissociation develops in which the person feels he is passively watching the environment and at the same time is being bombarded by vivid mental impressions. In short, his normal waking consciousness has been changed into what Aldous Huxley calls the esthetic consciousness, a higher level of awareness. In this condition the world is perceived as being unimaginably beautiful. Notions of past and future, of place, and of social role dissolve. Whatever is perceived is recognized as being utterly existing, entirely *there*. The esthetic mind, which has already moved one step in the direction of the irrational, has freed itself from enchaining words and insistently defining judgments based on pre-existing knowledge.

Following this, the esthetic consciousness passes insensibly into the visionary consciousness. In this condition, the world is seen as being not only unspeakably beautiful but also unfathomably mysterious. Every sensory impression is charged with meaning, and yet everything is understood to be unknowable. The mind is overwhelmed by symbols, the meanings of which are simply given. During this period the ego seems to die. Awareness becomes intensely vivid, and there is a progressive loss of control over sensory input. The ability to focus diminishes steadily. Previously understood boundaries become fluid. The familiar becomes novel and stupendously significant. Illusions occur and these are sometimes elaborated into hallucinations. Past memories obtrude and mingle with images from the present in timeless suspension.

Occasionally, at least, the level of visionary consciousness finally modulates into the mystical consciousness. In this deeper state or, if you like, even more profoundly psychotic condition, all conflicts are resolved. All is unity, even though such unity is composed of infinite diversity. There is a sense of oneness with the infinite. At every instant every element in the universe is being destroyed and recreated. Perhaps this is what is sometimes described as the death of the mind. The mind as an entity ceases to exist; it has become a part of the inexpressible unity and therefore perfection of all things.

From this state of oceanic bliss rebirth is possible; but the mind that proceeds backward to return finally to the normal waking consciousness may be an altered mind, and therein lies the personal and social significance of LSD.

7.

Plants for Self-Transcendence

There are perhaps 800,000 known species of plants in the world. Of these only about 3,000 are known to have been used as human food. In fact, the number of species that actually feeds man is very small. Of the 150 plants important to commerce, only about a dozen are basic foods for the billions of people in the world. Similarly, about 4,000 plants are known to yield psychoactive substances, but only about 60 have been used consistently for their intoxicating effects. Of these, hemp, the opium poppy, *coca*, tea, coffee, the tobacco plant, and the various plants from which alcoholic beverages are made are overwhelmingly the most important, at least in terms of number of users.

In cultures in various parts of the world in which psychotropic drugs have long been in use, these drugs were in every case used by the people to facilitate religious experience. Throughout Oceania, kava kava ceremonies initiated nearly every community activity. In Central and South America such psychoactive snuffs and drinks as parica and ayahuaska are used for the purpose of divination and necromancy. In Mexico peyotl and the sacred mushroom are used to expand the consciousness of seekers after eternal truth. In the Far East, betel nuts are chewed and such spices as nutmeg and mace are eaten for similar reasons. In Australia the aborigines use *pituri*, a plant that contains, most interestingly, scopolamine, the same substance that occurs in the jimson weed. In Ethiopia, the people very commonly use khat, a mild inebriant and euphoriant, and the use of this drug appears to be spreading. As has been noted, alcohol has also been frequently used in the service of religion in both the old and the new worlds. Opium and alcohol from the Middle East, Indian hemp from China, tea from the Far East, and *coca* from Peru have all played crucial roles in man's religious and secular history.

For at least 200 years a vision-inducing substance known as channa has been used by the Hottentots. This plant belongs to the genus *Mesenbryanthemum*; beyond that, remarkably little is known about it. In Southeast Asia the leaves of a plant from the genus *Mitragyna* are chewed for their narcotic effects. For this purpose, the leaves are often mixed with betel quid. From North Africa and west to India and China, the plant *Peganum harmala* is used. This plant, like the *Banisteriopsis* species of South America, contains harmine and harmaline, which can produce remarkable alterations of perception. In Eurasia this plant has had a very long history in folk medicine. In the tropical rain forests of West Africa, the plant *Tabernanthe iboga* contains the psychoactive drug ibogaine. This substance is said to have an effect quite similar to that of cocaine. In high doses it produces excitement, confusion, drunkenness, and hallucinations.

The point here is that in almost every part of the world man found edible and nutritious plants; but he also found plants that contained narcotic and hallucinogenic principles. *Homo sapiens* may indeed have become a predator, a vicious killer; but he would never have survived had he depended on the eating of flesh alone. In fact, if he had not retained some of the herbivorous characteristics of the other primates he would never have given up the pattern of nomadic wandering and invented agriculture. Out of agriculture grew the settlement, the city, and civilization.

The urge to preserve the self, it would seem, is universal. The fact that man searched with equal diligence for drugs that would alter his consciousness would suggest, therefore, that the urge to transcend the self is just as universal. Man explored his thousands of local worlds and found and preserved everything that he thought to be good. Edible plants were seen to be good because they sustained his life during periods in which his prey was elusive. Edible narcotics and hallucinogens were also classified as good because they allowed him to become someone other than his familiar self. It is not surprising that the vine was held to be as sacred as the grain.

The urge to achieve self-transcendence is so powerful that men have been willing to undergo the most exquisite misery in its pursuit. Many of the crude preparations made from naturally occurring plants are unpleasant to the taste; in addition, they frequently produce nearly insupportable side effects on ingestion. Yet men have everywhere been willing to endure unpleasant tastes, nausea, vomiting, and muscular cramps and to risk convulsions and even death for the promise of one glimpse of paradise. The case of the fly agaric mushroom, one of the most enigmatic plants in the world, serves to illustrate this point.

THE FLY AGARIC MUSHROOM

The plant *Amanita muscaria* is invariably described as a deadly poison. In small doses it will produce uncomfortable symptoms in most people. These include headache, dizziness, and vomiting. In large doses it is certainly lethal. However, it is also true that this plant can produce, in at least some of its devotees, a most remarkable euphoric and hallucinatory effect.

Although *Amanita muscaria* grows all around the world in high-temperate regions, there is no evidence whatsoever that the North American Indians ever discovered its psychoactive properties. Despite the fact that this mushroom grows in their country, the people of Hokaido in northern Japan also have no knowledge of its effects. However, in the far northwestern section of Siberia, certain tribesmen, the Ostyak, who live on the banks of a tributary of the Ob, have used this plant ceremonially for centuries. And, most interestingly, another group, the Chukchi, in the far northeastern section of Siberia, are also regular users of this mushroom. The vast area separating these groups is occupied by people who know nothing of the mushroom.

Gordon Wasson has made a remarkable exploration into the present use of this plant, and he has advanced the fascinating hypothesis that the fly agaric mushroom may be the ancient and mysterious soma of the Vedic hymns. (16)

The greatest mystery in the entire field of hallucinogens has always been the identity of soma. Practically every psychoactive plant in the world has at one time or another been advanced as the original source of soma.

About 3,500 years ago the Aryans moved from somewhere in the north to occupy the Indus valley of India. These people brought with them the sacred plant soma; they worshipped it and drank its juices. They also composed more than 1,000 hymns, many of them describing the ambrosial delights of soma. Ultimately they abandoned the use of soma without leaving any description of the plant itself. Wasson feels that this magical plant was the fly agaric mushroom, and in support of this hypothesis he has amassed a vast amount of evidence.

Concerning the fact that the sacred plant, soma, was an hallucinogen there is no doubt. In the Rig Veda, the earliest literary work of the Hindu religion, it is said that the priests regarded the drink as a divine inebriant. The god of soma was Indra, the slayer of dragons. Indra was the symbol of the sublime otherness that would be experienced by the intoxicated worshipper. Indeed, on achieving intoxication the eater of soma would become one with the drug, and as soma-Indra, enchanted, he would be recognized as a connection between the human and the divine. When the Aryans moved south, taking their northern ceremonies with them, they gave up the use of the drug because it was no longer available to them. In the course of time, Mongolian and Manchu people erupted toward the north and completely cut off the two remnants of fly agaric worship that remain today in the extreme northeast and northwest of Siberia.

Eating the fly agaric first produces a tendency to sleep. After two hours the eater of the mushroom becomes elated and is convinced that he can carry out magnificent feats of strength. Colorful visions appear, and these are described as unusually pleasurable. The mushroom is now known to contain several substances including muscarine, muscimol, and ibotenic acid. It seems likely that the last of these especially is the cause of the visions and the euphoria; but this is indeed a mysterious plant and chemists believe that other psychoactive agents will eventually be extracted from it.

In any case, the use of the mushroom is by no means advisable. Three out of four people who eat it experience only the most disagreeable nausea and headache and are not rewarded by the divine visions of the holy men of the Vedic hymns.

BEYOND EMPIRICISM

The empirical methods of primitive men were astonishingly successful in finding, testing, and retaining a very large number of intoxicating substances. Perhaps many more such drugs remain undiscovered in the wilderness, but modern man is too impatient to wait for the aboriginals to complete their search. The fate of the mind-altering drugs is already in the hands of the ethnobotanists and the chemists.

Up to now I have referred to only one of the contributions of the laboratory, LSD. Part 2 of this book will consider the extraordinary range of drugs, most of them synthetic, that have appeared in recent years. These have been the creations of modern technology and their application has been primarily but, as we shall see, not exclusively, medical.

Part 2

MEDICINE

8.

Early Psychopharmacology

Man's earliest use of such drugs as alcohol and opium probably predates written records of it by many centuries. In the Odyssey, Homer says that Helen of Troy received opium from the King of Egypt and he also provides us with an interesting description of the effects: "Whoso drinks thereof, no tears flow down his cheeks, though his mother and father die and men slew his brother or dear son before him and his eyes beheld it." Plato said concerning alcohol: "No experiment is less costly and none shall bear fruit more surely and more quickly, if we wish to test the different characters of men, to judge them and to be guided in the art of making them better, than to know them in the truth of the drink."

The word *opium* comes from the Greek word for juice. Opium is derived from the oriental poppy, an annual plant that stands from two to four feet high. In February and March the plant produces large white or yellow flowers up to seven inches in diameter. Shortly before the flowers fall, the fruit capsules are incised. The juices exuded solidify on the outer part of the capsule. The next day this crust, now turned brown, is scraped off. This is gum opium. For thousands of years, this product was collected in baskets and shipped by camel to various ports on the eastern Mediterranean.

Opium was mentioned by Theophrastus in the third century before Christ. Galen, the great Roman physician, apparently used opium as an analgesic and was greatly pleased with its effects. The only other important drug that could be used to alleviate pain was mandragora, which was derived from the mysterious mandrake plant. In fact, the active pharmacologic agents used by the Greek, Roman, Arabic, and medieval European physicians were few in number. It was not until the fifteenth century that there was any real advance in the science of drugs.

THE SCIENCE OF DRUGS

Toxicology is the study of poisons. Posology is the study of dosage. Therapeutics is the study of methods of treatment or literally, from the Greek, the art of medicine. Pharmacology is the science of drugs in the broadest sense.

Until very recent times, the development of all these sciences was slow and essentially folkish. The origin of pharmacology in the contemporary sense of the word may be traced to Paracelsus, a Swiss physician who lived at the beginning of the Renaissance and was a contemporary of other revolutionary figures such as Columbus, Michaelangelo, and Martin Luther.

Before the time of Paracelsus, alchemists spent most of their time searching for the philosophers' stone, an nstrument thought to be capable of producing perpetual youth. They also were much concerned with methods of converting base metals into gold. Paracelsus, by no means a popular figure at the time, announced that "the purpose of chemistry is not to make gold but to study the fundamental sciences and turn them against disease." When the extract, tincture of opium, was developed, Paracelsus named the preparation Laudanum from the Latin word *laudo* (I praise).

The first drug ever to be isolated that had a specific effect on an infectious disease was quinine. In 1670 two French chemists, Caventou and Pelletier, found the alkaloid in Peruvian cinchona bark and used it effecively to treat malaria. In 1760 Louis Cadet, an apothecary in the French army, joined arsenic to a carbon atom. The dreaded syphilis was finally vulnerable to reatment. In 1783, William Withering first used digialis, a drug derived from the purple foxglove, to affect he functioning of the circulatory system. Therapeutics advanced perceptibly, but progress was still very slow.

In 1798 Joseph Priestly invented nitrous oxide or aughing gas, and a few years later Sir Humphrey Davey remade this gas and reported that it caused him to dance around his laboratory like a madman. This drug, the first of the synthetic volatile hydrocarbons, was the first really effective anesthetic agent. It was followed in the nineteenth century by ether and chloroform.

Morphine was isolated from opium in 1807 by the German apothecary Frederick Serturner. He named this potent substance after the Greek god of dreams, Morpheus. In 1828 Wohler initiated a procedure that would change the very structure of society. His synthesis of urea, the first synthesis of an organic compound, established the basis for organic or carbon chemistry. From this date a vast number of dyes, plastics, and other organic compounds began to appear which were in time to effect vast changes in the world.

The bromide element was first discovered in the waters of the Mediterranean Sea in 1826. Very soon its depressant effect on the central nervous system was recognized and the bromides became valuable therapeutic tools. (Before long bromism began to appear as a result of overdosage with these drugs.) In 1829 paraldehyde was discovered. This polymer of acetaldehyde was found to be less toxic than ethyl alcohol and was an excellent sedative. Chloral hydrate, a chlorinated derivative of ethyl alcohol, was first made in 1832.

Since any drug that is effective in reducing whatever distress it is that a person feels is also capable of producing dependence, a great many people living in the nineteenth century became thoroughly dependent on the use of paraldehyde and chloral hydrate. The nineteenth century had its drug fashions too.

In 1853 a genuine revolution was wrought by Alexander Wood of Edinburgh. This man invented the hollow hypodermic syringe after an idea which had been formulated by Sir Christopher Wren nearly two hundred years earlier. No longer was it necessary to administer drugs orally, rectally, or by inhalation. From the point of view of our interest in the psychoactive drugs, this was an epochal development. During the American Civil War morphinism became known as the soldier's disease because of the vast numbers of men who became dependent on morphine following intravenous administration of this opiate.

Cocaine was isolated in 1860, and its value as a local anesthetic was soon noted. Crude *coca* had, of course, been chewed by the Incas for centuries, and the drug was already known to be a stimulant of the central nervous system.

However, it is two tremendous developments at the turn of the century that admit us to the modern era from the addictionist's point of view. First, in 1898, with the acetylation of morphine, diacetyl-morphine or heroin was created. In combination with the syringe, this extraordinarily vicious drug was to become the basis of modern opiate addiction. The camels continued to carry their baskets of crude opium to Lebanon, but now morphine was extracted and shipped to Marseilles. In that city and perhaps in a few Italian cities, the morphine was converted into heroin and prepared for shipment to all the victim countries of the world. The second development was the synthesis in 1903 of the barbiturate Veronal. In the years following this more than 2,500 varieties of barbiturates were to appear.

The immense expansion of the science of drugs that followed the coming of the barbiturates and heroin can probably be most conveniently considered under seven headings, each of which draws attention to a basic reason underlying the use of psychoactive drugs. Though many of the thousands of chemicals that man has either discovered or synthesized have been used at various times for more than one of these reasons, each drug will be especially considered under the heading that provides the most common reason for its use.

REASONS FOR USING PSYCHOACTIVE DRUGS

1. Man has searched for *sedatives* to calm his mind by depressing his central nervous system. (Drugs that have a more profound sedative action are called *soporifics*. They promote sleep.)

2. He has suffered from pain and has therefore searched for *analgesics* to ease each distress.

3. He has sought to go beyond the mere easing of mental and physical pain to achieve detachment and euphoria. Although all drugs that cause perceptible depression of nervous activity might correctly be called *narcotics*, this word is now arbitrarily restricted to certain drugs such as opium and its derivatives, some potent synthetics, and a few drugs that are not properly narcotic at all. (Marihuana, for example, is often described legally as a narcotic; but its action on the nervous system indicates that it should more properly be called an illusionogen.)

4. He has desired to combat fatigue and increase his endurance. Alertness and mental exhilaration are consequent upon the use of the *stimulants*.

5. He has abhorred that variation in mood known as depression and has therefore sought to brighten his spirits. Though the stimulants have been used for centuries to achieve this, modern chemistry has produced certain drugs that are remarkably specific in this respect. Although these drugs undoubtedly raise the spirits, most of them do not have a marked stimulating effect on the higher centres of the brain. These are the *antidepressants.*

6. He has been tense and fearful in response to threatening stimuli from within himself or from his environment. He has searched for and found a great many drugs that tend to inhibit the anxious response without markedly affecting the clarity of his thought. Such drugs are the *ataractics* or *tranquillizers.*

7. He has desired to alter his consciousness not through obliteration but through what has been called mind-expansion. The first part of this book dealt with this in terms of man's urge to achieve the mystical state. In the second part, the drugs that break down ego boundaries and heighten perception of sensory stimuli will be considered in their relation to therapeutic medicine.

9.

The Sedatives

The most ancient sedative-hypnotic is alcohol. This drug is a central nervous system depressant the overuse of which results in intoxication, psychic habituation, physical dependence, and finally withdrawal symptoms of great severity. Alcohol is by far our most important sedative today in terms of numbers of users and of the physical and social disruption it causes. The fact that it is our society's supreme recreational drug, however, makes it logical to postpone consideration of this chemical until Part 5, the section in which recreational uses of drugs will be discussed, and to confine our attention in this chapter to other sedatives whose pattern of use is primarily medical.

THE EARLY SEDATIVES

Paraldehyde, synthesized from acetaldehyde in 1829, is a close relative of ethyl alcohol, but it is both more potent as an hypnotic and more toxic than alcohol. Because it has an extraordinarily disagreeable taste, however, this drug has at no time been a serious threat to alcohol as an ingredient in beverages. Nevertheless, chronic alcoholics have been known to use this horrible material when their chemical of choice was temporarily unavailable. It has also been used in the treatment of withdrawal from alcohol. For decades, mental hospitals were rank with the stench of the drug, but with the introduction of less malodorous sedatives its use has been virtually discontinued.

Chloral hydrate is more toxic and more potent than paraldehyde. Although it was first synthesized by Liebig in 1832, its hypnotic properties were not discovered until 1869. It, too, is a derivative of acetaldehyde and is therefore a close relative of alcohol. In general, the central nervous system depression produced by chloral hydrate is confined to the cerebrum, and the vital medullary centres are unaffected. However, large doses can ultimately cause profound narcosis and respiratory paralysis. (The widespread belief in the 1930's that a small dose of chloral added to a victim's alcohol drink would produce an exaggerated narcotic effect is probably not well founded.)

Studies have shown that chloral hydrate and the alcoholate of chloral which is the active principle in the knockout drop are equally potent hypnotics. Nevertheless, chloral is habituating and tolerance develops. The drug is irritating to the stomach and has an unpleasant bitter taste. It was largely replaced by the barbiturates after the turn of the century.

THE BROMIDES

The salts of hydrobromic acid have been used as depressants of the sensory and motor cortex for over a hundred years. In man, from one to three grams of sodium bromide produces somnolence. Concentration is impaired, and the user feels dull and detached. It was soon discovered that in cases of epileptic hyperexcitability of the cortex bromides would reduce the number of seizures. They were of great value as anti-epileptic drugs until they were displaced by phenobarbital and Dilantin in this century.

The bromide ion circulates in the blood and is slowly excreted by the kidneys. However, the kidneys appear to be unable to distinguish between chloride and bromide ions, with the result that bromide is excreted exactly in proportion to its concentration in the blood. Because of this curious fact, the practice in treatment was to put the patient requiring a bromide on very low sodium chloride diets. The total salts excreted would in this way remain low, and the circulating bromide would not be appreciably depleted.

With prolonged intake of bromide, a syndrome known as bromism appears. There is gastrointestinal distress, fetid breath, conjunctivitis, and a skin rash similar to acne. When the blood bromide level exceeds about 150 mgs delirium, hallucinations, and a marked diminution of intellectual power are noted. There is staggering, slurred speech, and a clouding of consciousness. The treatment of bromism includes administration of very large amounts of sodium chloride daily. The kidneys proceed to excrete bromide and chloride ions indifferently, with the result that the bromide concentration steadily diminishes and the symptoms clear.

Bromides are undoubtedly habituating because of their central calming effect. The continuing production of such preparations as Calmex, Bromolate, Bromo Seltzer, and the bromine-containing drug carbromal confirms the suspicion that there is still a very great interest in bromide sedation in spite of the appearance in recent years of formidable challengers.

THE BARBITURATES

Barbituric acid was first synthesized in 1882, but it was not until 1903 that diethylbarbituric acid was made and found to possess hypnotic properties. This was called Veronal, and it remained the only species of its class until phenobarbital or Luminol appeared just before World War I. From such unhurried beginnings came the explosive development of several thousand barbiturates accompanied by intense public devotion to them, a great deal of good, and much mischief.

The barbiturates cause depression of central nervous system activity ranging, according to dose, from mild sedation to anesthesia. There is a depressant effect on the sensory and motor areas of the cerebral cortex. The drugs not only elicit sleep; they also inhibit convulsions. With larger doses, the inhibition appears to proceed further down the brainstem. Death occurs from respiratory paralysis.

These drugs are very roughly divided into two categories—long-acting and short-acting. The former include the earlier discoveries barbital and phenobarbital. The short-acting barbiturates include Sodium Amytal, Nembutal, Seconal, Butisol, and Medomin. Pentothal sodium has had a particular application in medicine as a short-acting general anesthetic when given intravenously. Beyond the clinics these drugs have been collectively named goofballs. Individually they are known by such names as Red Devils (secobarbital), Blue Heaven (amobarbital), and Yellow Jackets (pentobarbital), from the design of various capsules. Tuinal or "Double Trouble" is a combination of amobarbital and secobarbital. These drugs are used by millions of people as daytime, but especially nighttime, sedatives. They show the phenomenon known as tolerance in which more of the drug is required as time goes on to achieve the same effect. They are markedly habit-forming among vulnerable people, and withdrawal from barbiturates is now considered to be more severe and hazardous than withdrawal from opiates. Gradually, as the use of these drugs increased, the illicit market reached huge proportions. In 1961 the barbiturates were included in the Controlled Drug Regulations of Canada and infractions of these laws became indictable offences.

The long-acting barbiturates tend to be largely excreted by the kidneys. About 85 per cent of the ingested drug may be recovered in the urine, so resistant is the preparation to oxidation in the body. In a person whose kidney function is impaired, the excretion of barbiturates will be retarded. The short-acting barbiturates are largely broken down in the liver. Patients with advanced liver disease should not be given these preparations.

The effects of the barbiturates vary enormously. A therapeutic dose may be insufficient to produce sleep in some people, while in others the same dose may produce excitement, delirium, and hallucinations. Barbiturate poisoning will be considered in Part 4 of this book.

There is no doubt that the barbiturates have been extremely valuable in medicine. They are undeniably effective as sedative-hypnotics. Their anti-convulsant and anesthetic uses have been noted. Yet precisely because they are so efficient in calming overanxious people during the day and sleepless people during the night, they have been overused. The development of dependence is insidious and inexorable, and finally the patient is convinced that he cannot relax or sleep unless he is supported by his magic chemical. He increases the dose or mixes the barbiturates with other central depressants, and finally he passes that variable point beyond which he must be considered to be dependent.

The person who is dependent on barbiturates is notoriously resistant to interference with his dosage schedule. Indeed, among the many varieties of drug dependent people the barbiturate habitué is perhaps the least able to recognize that his pattern has become a potential threat to his security. On the contrary, he is convinced that his security depends upon the pill. Moreover, he is protected by the fact that the use of barbiturates is condoned by society. He is not, he is quite sure, an inebriate as he perceives the alcoholic to be, nor a drug addict, as he perceives the user of marihuana or the opiates to be. He has a prescription from his doctor, everything is quite legal, and he must have his sleep. Moreover, he is protected further by another curious fact concerning the use of pills. He takes his drug in secret. There is nothing social in this pattern, and no one can possibly know the extent of his dependence except, perhaps, his doctor. Barbiturate overuse is pre-eminently a solitary vice, to resurrect a dread expression from the nineteenth century. If his doctor should protest, it is a very easy thing to agree to maintain the dose and secretly apply to a second doctor complaining of insomnia.

Motor incoordination is the effect that finally brings the condition of the secret eater of barbiturates to the attention of others. It is not at all clear as yet to what extent the barbiturates are responsible for car accidents, but it may be safely assumed that the contribution is considerable. Chronic intoxication with barbiturates eventually begins to resemble chronic intoxication with alcohol. Not rarely, these two conditions develop simultaneously in the same person. The common addition of automobiles to this situation can clearly be disastrous. As a rule, however, the accident is reported as having been caused by alcohol. The Breathalyzer measures only the alcohol in the air expired from the lungs. Clouding of the intellect by barbiturates may well be the cause of a great many accidents uncritically assigned to alcohol.

NON-BARBITURATE HYPNOTICS

In recent years, several new non-barbiturate sedatives have appeared on the scene. The popular need for sedation has been established and further promoted, but in the wake of widespread criticism of the barbiturates much effort has been put into the search for alternatives. The ideal sedative would be effective, non-habit - forming, free of hazardous side effects, and blessed with an enormous margin of safety in relation to accidental or intentional overdosage.

One of the resulting products was glutethimide or Doriden. This drug was soon widely used in place of the increasingly feared barbiturates, but much evidence soon appeared to indicate that Doriden must also be habit forming. People dependent on Doriden increased their intake up to 12 grams daily and suffered from excitement and grand mal seizures on withdrawal.

Several other chemicals with central depressant actions have also become quite fashionable in recent times. These are methylparafynol or Dormison, ethchlorvynol or Placidyl, ethinamate or Valmid, and methyprylon or Noludar. All of these drugs resemble the short-acting barbiturates and all are capable of producing dependence in vulnerable people. There is probably some justification for replacing a barbiturate with one of these chemicals in some cases, but neither the physician nor the patient should conclude that the risk of habituation is thereby completely obviated.

OVER-THE-COUNTER SEDATIVES

When the antihistamines were first introduced a number of years ago, one of the untoward side effects of these drugs was a tendency to produce drowsiness. As a result, newer antihistamines were created that emphasized the anti-allergic reaction on the one hand or the sedative reaction on the other. One of the most effective of the sleep-inducing antihistamines was found to be methapyrilene HC1. A number of preparations that contain this chemical are now available without prescription. They are mild sedatives but, of course, their effect may be decidedly more than mild should the dose be increased. Very significantly, a number of these preparations also contain the anticholinergic* drug scopolamine. Nytol contains methapyrilene HC1 25 mgs and salicylamide 200 mgs. Sedacaps and Somicaps contain only the antihistamine.

THALIDOMIDE

It seems appropriate here to diverge briefly to refer to one of the hazards of life in what I often refer to as the chemophilic (drug-oriented) age. The newer drugs may well be extraordinarily effective with respect to some particular action, but they sometimes contain other properties altogether unsuspected at the time of their release for general use.

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*For an account of the effects of such drugs, see Chapters 15 and 16.

Thalidomide was a most efficient sedative-hypnotic. The demand for sedation was so intense that the manufacturers, the licensing bodies, and the people rushed headlong into the embrace of this appalling chemical. Among the thousands who were soon taking this drug were a good many pregnant women. The tragic consequence of this was the birth of deformed babies.

The lesson of thalidomide was a harsh one, yet one which is still imperfectly learned. The drive to achieve mental and physical ease is progressively more furious, the competition to satisfy it is more and more vicious, and the notion that such disorders as habituation may be as crippling as physical deformity is by no means understood.

10.

The Treatment of Pain

It is one of the characteristics of the animal organism that when it senses noxious stimuli it moves away from the threat of further injury. Discomfort is somehow to be avoided; indeed, ease or pleasure may be defined as the absence of pain. In the higher organisms pain can be physical or mental; the avoidance reaction is similar in either case. Although in man the extraordinary development of cortical control has caused the appearance of such paradoxical conditions as masochism, we may assume for our purposes that man overwhelmingly desires to avoid pain and to seek pleasure.

From his earliest days, it is certain that man suffered from hurtful influences. He could be burned by the sun and by fire; he could be injured in hunting or fighting; he could be chilled by the night and the winter; he could be hurt by infections and a thousand kinds of physical disorders. Accordingly, he sought to deaden physical pain. We know that man very early turned to the use of the narcotic actions of such drugs as opium, alcohol, and mandragora to diminish pain but that none of these was really effective against the torment of very severe pain. In large, more soporific doses these drugs would become life-threatening, and virtually to the point of death the pain would still be sensed.

The attempt to find relief appears frequently in literary and historical records. Into the wine that Ulysses drank, Circe put nepenthe (opium). In Babylon, the mandrake or may apple was familiar and was said to be an aphrodisiac as well as a narcotic. Mandrake wine was used in surgical operations by Dioscorides, one of Nero's surgeons. The plant became an important element in European folklore. When it was pulled from the earth its roots, which have a vaguely human form, were said to shriek, and this anguished scream was said to cause madness in those who heard it. Consequently the plant was tied to a dog and the harvester ran away, closed his ears, and called the dog. However, mandrake was a poor analgesic. Surgeons generally preferred to rely on rapid operating techniques to limit the suffering of their patients.

Actually the progress of anesthesia was greatly impeded by the belief that pain was natural and that to interfere with it was to defy God. With respect to childbirth, for example, references were always made to the curse in Genesis III:16: "Unto the woman he said, I will greatly multiply thy sorrow and thy conception; in sorrow shalt thou bring forth children."

Eventually, however, yet another biblical passage was used to counteract the effect of this. In Genesis II:21 there is a description of a celebrated surgical operation. "And the Lord caused a deep sleep to fall upon Adam, and he slept; and He took one of his ribs, and closed up the flesh instead thereof." On such philosophic planes was the great battle for acceptance of general anesthesia fought out.

In the seventeenth century the English physician Sydenham used opium so frequently that he was called Dr. Opiatus. He asked, "Who would be calloused enough to practise medicine without opium?" In fact opium and, much later, morphine became essential drugs in the practice of medicine. The constant search continued, however, for a less potent analgesic that could more appropriately be used in the treatment of milder forms of pain. Such a drug would not be addictive and it would neither affect the activity of skeletal muscle nor interfere with mental alertness.

THE SALICYLATES

The first great success in this search occurred in 1838 when the glucoside salicin was found in the bark of willow and poplar trees. (The American Indians had made a fever-reducing tea from the bark of the willow.) The salicylates which quickly followed this discovery and which were soon synthesized from phenol became one of the basic instruments of therapeutics. In addition to reducing pain, they had a temperature - lowering effect in people suffering from fever yet did not reduce temperature in people free of fever.

Salicylates apparently act on the thalamus of the midbrain to increase the threshold to pain sensitivity. Today many proprietary compounds contain derivatives of salicylic acid.

ASPIRIN AND RELATED PREPARATIONS

The most famous of the salicylate derivatives is undoubtedly acetylsalicylic acid or Aspirin. Though this chemical was synthesized in 1853, it was not discovered to be useful in Western medicine until 1898 when a chemical worker in Germany used it in the treatment of rheumatoid arthritis. Today there are numerous preparations that contain Aspirin. Though skin rashes have occurred in sensitive individuals, the toxic effects are generally slight. It is nevertheless the leading cause of accidental death in children. Bottles of this drug are found in every home, frequently on lower shelves, and children sometimes eat the tablets as though they were candy.

Other products in the Aspirin group include acetanilide, a coal tar derivative not commonly used today; acetaminophen, a drug which, though less effective than Aspirin in the treatment of both fever and pain, is less irritating to the stomach; and phenacetin (acetophenetidin), a coal tar derivative that has been shown in recent years to be toxic to the kidneys. Because it is used in combination with other drugs in the manufacture of many drug products and because some of these are used to excess, phenacetin has become a clinical problem. Salicylamide and sodium salicylate are both quite similar to Aspirin.

When the original Bayer patent ran out, hundreds of companies began manufacturing their own salicylate products. Usually these are combinations of several chemicals. APC tablets contain aspirin, phenacetin, and caffeine. Anacin contains aspirin and caffeine, and Empirin is similar to APC. Some of these newer products also contain codeine.

Because all of these chemicals may be irritating to the gastric mucosa, they are often buffered with small amounts of antacids. Thus Bufferin is composed of the antacids aluminum glyconate and magnesium carbonate as well as aspirin. A variety of products also contain substances that cause fizzing. Thus Alka-Seltzer contains citric acid and monocalcium phosphate along with baking soda and aspirin.

A curious fossil from the nineteenth century is the product Bromo Seltzer. Acetaminophen and phenacetin are included to reduce pain. Caffeine is added and also potassium bromide. This compound also contains baking soda as an antacid and citric acid to produce fizzing. Bromism, once a virtually extinct disorder, has been more commonly reported in recent years from the overuse of such preparations. Bromine was considered in the chapter on the sedative drugs. It is interesting in the context of the present topic, however, that some products containing bromine and others containing one eighth grain of codeine are still available across the counter in this country.

Most Aspirin-based preparations are mild and not very toxic. They have only a slight depressant effect on the cortex and they do not produce euphoria. Discussion of them is included in this book because they are, in a rather circuitous fashion, habituating. They are a part, a rather innocuous part to be sure, of the drug scene today in the sense that they are partly responsible for today's prevailing attitude toward drugs. Aspirin-based preparations are felt to be innocent; they are extensively used for the treatment of progressively milder forms of discomfort. Moreover, they have an important placebo effect. Though the sedative properties of Aspirin clearly are minimal, this drug is believed by thousands of people to be a valuable aid to sleep. Most significantly, Aspirin preparations engender in their users the habit of casually taking chemicals to alleviate any signs of physical discomfort. The habit of taking something, for whatever purpose, is overlearned and then, when some more distressing condition develops, the transition to more potent drugs is remarkably easy.

It seems obvious that the casual use of drugs like Aspirin has something to do with the steadily lowering resistance in our population to the ancient concept of endurance. To endure today is no longer considered to be virtuous. It is, indeed, considered to be rather foolish and pigheaded. Why should any man, in the age of comfort, deny himself the simple satisfaction of ease?

INTERMEDIATE ANALGESICS

The ideal analgesic, presumably, would be one which obliterates pain but which has no central effect whatever and cannot lead to addiction. The salicylates would qualify if only they were more potent. The opiates, which will be treated in the next chapter, are tremendously powerful but they are also very vicious. In the search for non-habit-forming analgesics a number of chemicals have been synthesized and triumphantly advanced. All have failed for a shatteringly simple reason. *Any drug that actually alleviates severe pain must necessarily confer on its user massive relief. The gratitude that is felt by the recipient in his pain-free state will be closely remembered against the return of the hated pain.*

A few successful intermediate analgesics have been introduced, however. Darvon (propoxyphene hydrochloride) is a fairly effective analgesic, but in doses several times in excess of the standard prescription it produces sedation and dizziness. Because many people who have pain also seek mental relaxation, such a drug must necessarily be potentially habit-forming for at least some of its users. This drug is used in the treatment of pain in the milder range in which codeine is generally used. However, large doses are irritating to the stomach if taken orally and to the tissues if injected. Very large doses will produce central nervous system and respiratory depression and finally convulsions. The drug is not regulated by the narcotic laws, probably because it does not produce the euphoria of morphine, because abstinence symptoms are generally mild, and because it is not a powerful analgesic. Such a drug is not likely to be a dangerous factor in addiction, at least in the sense that the opiates are. The combination of Darvon and Aspirin is about as potent as codeine and Aspirin, but the latter combination is much cheaper. In spite of this, Darvon has become one of the most widely used products on this continent, and cases of habituation have begun to appear.

Methocarbamol or Robaxin is a muscle relaxant that is useful in such conditions as sprains and muscle cramps. However, it too can cause drowsiness, a clear indication of a central sedative effect.

Phenylbutazone or Butazolidin is valuable as an analgesic in muscle and joint pains. This drug is sometimes also used to reduce the sensitivity to minor injuries in horses. Since the disclosure that it may be responsible for kidney and bone marrow damage, however, its use has been sharply restricted. Hepatitis and bleeding stomach ulcers are among the other hazards associated with this otherwise valuable analgesic. Moreover, using phenylbutazone with other chemicals may markedly increase the possibility of toxic reactions.

No doubt the most famous of the intermediate drugs is codeine. This drug derives from morphine, the principal alkaloid of opium. With the methylation of this chemical, methylmorphine or codeine is produced. This drug is both a mild analgesic and a cough suppressant, and as such it appears in numerous proprietary medicines. In such a preparation as 222 tablets, for example, one eighth of a grain of codeine is combined with six grains of acetylsalicylic acid and one half grain of caffeine citrate. It is remarkable that in many places this preparation may be obtained without a prescription. There have been cases in which people have regularly used up to 100 of these tablets (nearly 12½ grains of codeine) daily.

The hazard here has been not, perhaps, so much the risk of codeine narcosis as the effect of the huge dose of phenacetin (2½ grains per tablet) that this product contained until recently. This drug is markedly toxic to the kidneys, and in large doses serious renal injury may occur. As it is at the moment, *at least in Canada,* there is no effective control over the excessive use of many drugs containing codeine and phenacetin. In the case of 222 the Frosst company voluntarily decided in 1970 to delete phenacetin from the formula of their very popular product.

MENTAL PAIN

Pain that is not primarily physical and physical pain that is of psychogenic origin are usually dealt with by other classes of drugs. The chapter on sedative-hypnotics touches on this subject, and the discussion will be continued in the section on stimulants and tranquillizers. However, many of the analgesics themselves have a depressant effect and this, no doubt, accounts for their emergence as important drugs of dependence. Indeed, the opiates and synthetic narcotics, the most vicious drugs known to man in terms of their tendency to create dependence, are in this group.

OUR PERSISTING NAIVETE

A very few years ago a shining new drug, pentazocine or Talwin, was introduced to a public waiting in pain. Initial investigations in Canada suggested that this drug was an effective analgesic but that, most agreeably for all concerned, it could not be implicated in addiction. Accordingly, it was concluded that the inclusion of pentazocine in the narcotics schedule was not warranted.

In 1969 the Food and Drug Directorate in Ottawa asked the manufacturer to amend its professional literature. Prior to the issuance of this advice, reports had accumulated to the effect that narcotic addicts were using pentazocine as a replacement for heroin when their drug of choice was not available. In other cases brought to the attention of the Drug Adverse Reaction Reporting Program, moreover, there was evidence that patients using the drug under medical supervision were increasing the dose and frequency of use, that withdrawal symptoms were being seen, and that the prescribing doctors were innocent of any information other than that this was a potent analgesic that could not cause addiction.

No such ideal analgesic can ever be made. Any drug potent enough to reduce severe pain will always create dependence in some of its users. The case of pentazocine illustrates very well our eternal hopefulness.

In fact the dependence potential of pentazocine is still considered by the Food and Drug Directorate to be so slight as not to warrant the inclusion of the drug in the narcotics schedule. Perhaps it will be sufficient to indicate clearly to physicians that dependence, though not a major problem, is certainly possible in the case of this potent and effective analgesic.

11.

The Narcotic Drugs

Opium is obtained from the unripe seed capsules of the oriental poppy, *Papaver somniferum*. It is thought to have been used by man for about 4,000 years and has spread from its place of origin in Asia Minor to every part of the world. The analgesic and euphoriant properties of this drug were well known to the ancients. There are references to it in Homer, Pliny, Virgil, and Dioscorides. From the eastern Mediterranean and Persia, the plant was carried to India. It is not known when this actually happened, but the drug probably did not become important there until the fifteenth century. In the sixteenth century, however, the popularity of opium grew rapidly in India and by the time Warren

Hastings became the first Governor-General of India in 1773, the cultivation of the poppy in that country had reached enormous proportions. Arab and Persian traders had spread the plant to China as well, and a vast population in that country eventually became dependent on the drug.

Hastings exercised political control of India in the name of the Crown, but left all matters relating to trade in the hands of the East India Company. At that time, the most valuable item of trade in India was opium. The Company managed the cultivation and export of this material; it had virtually a world monopoly. The chief importer was China, though China already grew large quantities of opium within its own borders. The directors of the Company wrote: "If it were possible to prevent the use of the drug altogether except strictly for the purpose of medicine, we would gladly do it in compassion to mankind." Accordingly, the East India Company, desiring to avoid committing a crime against humanity and desiring, moreover, to be clear of English criticism, disengaged itself from direct shipment of opium to China. The Company held, however, that to stop the growing of opium in India would be ruinous to the thousands of native planters, and so it held an immense opium auction every year during which it usually made a very large profit. The opium clippers increased in numbers and became known as China Clippers. China, at the same time, officially condemned this trade and closed its ports to British, French, and American ships. Smuggling developed on an immense scale and was relatively free of hazards because of the connivance of trading captains, the hong merchants of Canton, and officials of the Chinese government. Ships returned to Europe burdened with tea and spices and there was a degree of apparent peace, yet the British, as the greatest seapower in the world, were offended by Chinese defiance. The Chinese Empire, proud and civilized, remained aloof and obdurate. Only one port, Canton, was open to foreign vessels.

With the Industrial Revolution already in progress, there was an increasing need for raw materials and for markets for English manufactured goods. The exigencies of world trade now made the refusal of the Chinese to remove the barriers to the forbidden kingdom intolerable. Numerous Western emissaries were sent to Peking but to no avail. The situation deteriorated steadily until armed conflict became unavoidable.

The first war between China and Great Britain took place between 1839 and 1844. This conflict began over the question of the importation of opium. Peking had dispatched a commissioner named Lin Tse-Hsu to enforce existing laws against importation of raw opium. Lin seized cargoes lying off Canton and made the captains sign bonds that they would refrain from further trade. The British, mightily annoyed, defeated the Chinese on a number of occasions along the Yangtze and finally, in 1842, the Chinese signed the Treaty of Nanking. In this treaty the island of Hong Kong, a desolate place inhabited only by a few fishermen, was ceded to Great Britain and five Chinese ports were opened to trade. British officials were to be treated according to their rank by Chinese officials of the same rank. There was absolutely no mention whatever of opium in this treaty.

Stress continued to build up, however, because the treaty was not satisfactory to either side. The British still could not travel to the interior of China, and the Chinese failed to treat the people they described as barbarians as equals. The second Opium War was inevitable.

In this affair the British and French engaged the Chinese in a series of conflicts between 1856 and 1860. Canton was occupied and Peking was threatened. The Russians, observing the weak condition of the Empire, occupied all of the Chinese territory north of the Amur. In 1858, the Chinese signed the Treaty of Tientsin. This time opium was specifically mentioned and a fixed price was set. Its importation was legalized by the Chinese. Christian missionaries were accepted and their work sanctioned. More ports were opened and there was to be peace. But peace did not come and, as a consequence of this, the British occupied Peking in 1860. The Chinese, this time, were forced to sign an even more disadvantageous document. The British were ceded the Kowloon promontory opposite Hong Kong and the Russians moved into all of the territory east of the Ussuri. This immense coastline included the important port of Vladivostok.

Opium smugglers once again became legitimate traders, and the traffic in opium from India to China flourished. The Chinese government, on considering the injurious effect of opium on its people, was not, however, quite contented. In 1906 a ten-year agreement was reached by which the Chinese would reduce their domestic cultivation of opium *pari passu* with the reduction in the importation of opium from India. This plan was tried for a few years, but the instability of the Chinese government and the unwillingness of the traders to accept restriction prevented its final success.

In 1909, President Theodore Roosevelt of the United States suggested that an international convention be held, and this took place in Shanghai in that year. The conclusions of this meeting became the basis for the first opium convention in The Hague in 1912. This convention provided for the control of cultivation and export of opium. The alkaloids of opium were to be strictly reserved for medical purposes. A number of further meetings were held in the following years, eventually under the auspices of the League of Nations. The United Nations Single Convention on Narcotic Drugs was drawn up in New York in 1961, and this document remains, at the present time, the essential basis for international law regarding these drugs.

OPIUM

The oriental poppy is a plant that requires cultivation. It also demands special climatic conditions. Today it is grown in Turkey, Iran, Egypt, and India. The amount still grown in China is not known. Although the climate of Mexico does not appear to satisfy the plant's requirements, some poppies are grown in that country. Most of the world's opium today is cultivated in Asia Minor.

ALKALOIDS OF OPIUM

The alkaloids constitute about 25 per cent of powdered opium. They are divided into two chemical classes, the phenanthrenes (morphine, codeine, and thebaine) and the benzylisoquinolines (papavarine, noscapine, and narceine). Morphine (10 per cent of the crude opium) is the principal source of the pharmacologic effects of opium.

After briefly stimulating the higher centres, morphine depresses the central nervous system. The effects include analgesia, drowsiness, changes in mood, and mental clouding. In the presence of physical pain therapeutic doses will produce a state of contentment, detachment from concern, freedom from distressing emotion, and mental exhilaration. This is a condition that is usually described, in summary, as euphoria. In the absence of pain the unpleasant condition known as dysphoria may occur, making the user tense and frightened rather than euphoric. With larger doses euphoria is invariably the result, however, and this is felt in spite of the nausea and vomiting that commonly occur as well.

Under a moderately high dose of morphine, mental and physical performance is impaired; the body feels warm, the extremities heavy, and the mouth dry. Drowsiness continues to the point of somnolence, and sleep may ensue. If the dose is further increased, respiratory depression becomes progressively more marked. The analgesic effect of morphine appears to occur not because perception of pain is reduced, but because the patient experiences an altered reaction to pain. Pain persists but the patient seems unconcerned.

It would seem that the experience of pain involves two quite distinct aspects. There is the original sensation of pain which is derived from some source within the body; and there is the reaction to that pain. The analgesics probably have their greatest effect not on a patient's ability to perceive pain but on his ability to tolerate it. An analgesic such as morphine confers a degree of detachment that allows a person to endure major discomfort as though it were somehow alien to his mind. Euphoria, by extension, allows a person to exist amid great social and psychological stress without the need to react to it or to sense the possibility of further injury as a threat.

Because of the intense pleasure associated with the use of morphine and a number of other narcotic drugs, there is a tendency for the user to return to the drug after the initial effect has disappeared. With repeated use marked tolerance is seen. Increasingly large amounts of the drug are required to achieve the pleasurable effect. Finally, an addict may be taking many times the daily therapeutic dose of morphine or heroin. He may no longer experience euphoria; now he takes the drug mainly to prevent the appearance of the withdrawal symptoms. Moreover, addicts usually do not know the potency of illicitly procured capsules. The result is the occasional overdose.

Accidental overdose is also a possibility for non-addicts, and morphine has also been involved in many suicides and attempted suicides. Toxic doses of more than 120 mgs can produce coma within 15 minutes. With very large doses the patient cannot be roused. The pupils are pinpoint in size; the skin is cold, moist, and cyanosed; breathing is diminished to three or four respirations per minute. The blood pressure falls steadily. Shock soon follows. The skeletal muscles are flaccid; the tongue may fall back and block the airway. Death from respiratory paralysis is imminent.

Coma, pinpoint pupils, and depressed respiration are signs that suggest morphine poisoning. The finding of needle marks along the lines of the veins is a further indication that the patient has taken an overdose of one of the narcotic drugs. However, it is quite likely that other drugs will also have been taken. Alcohol or one of the barbiturates may considerably confuse the picture.

Treatment of morphine overdose requires maintenance of the airway, oxygen administration, and possibly artificial respiration. The use of 3-5 mgs of the narcotic antagonist nalorphine intravenously every 30 minutes will definitely establish the diagnosis. The patient will emerge from the coma to enter upon a stuporous state. Because serious withdrawal symptoms could result, care must be taken to avoid overdosage with nalorphine in a person known to be addicted to narcotic drugs. Such symptoms might well be more dangerous than the original respiratory depression.

OTHER NARCOTIC DRUGS

Codeine (methylmorphine) is about one tenth as potent as morphine, both as a central nervous system depressant and as a euphoriant. Tolerance undoubtedly occurs, and people have been known to take more than 12 grains daily. The drug is contained in a number of proprietary medicines that may be obtained without a prescription. Because it depresses the cough centre, it is included in a number of cough medicines. It is also, of course, a mild analgesic.

Dihydromorphinone HC1 (Dilaudid) is a more powerful analgesic than morphine. It produces both euphoria and dependence.

Methylhydromorphinone HC1 (Metapon) is twice as potent as morphine as an analgesic but produces no emetic or respiratory responses in therapeutic doses.

Pantopon is a mixture of the alkaloids of opium approximately in the proportion that they occur in the crude drug.

Paregoric is camphorated tincture of opium. It contains 0.4 per cent opium in addition to camphor, oil of anise, and benzoic acid. This preparation has been used for many years as a treatment for diarrhea. The therapeutic dose is 4-8 cc. diluted in water.

While Laudanum (tincture of opium) is still also used for the treatment of diarrhea, there is really no justification for this today.

Dover's Powder is ipecac (an emetic and antidysenteric made from a South American shrub) and opium.

NARCOTICS IN THE UNITED STATES

During the nineteenth century opium and its alkaloids were extensively used in Western medicine. With the introduction of the hypodermic syringe during the American Civil War the use of intravenous morphine became widespread. Shortly after this, opium smoking was introduced to the United States by Chinese immigrants. The first reference to drug addiction in the United States, however, did not appear until the publication in 1892 of Osler's *Principles and Practice of Medicine*. At the time there were no controls whatever on the distribution of narcotic drugs, and it has been estimated that in the 1880's about 3 per cent of the

American population was dependent on them. Narcotics were included in soft drinks, baby tonics, cough medicines, and nearly every household remedy.

A great many literary descriptions appeared concerning the effects of opium and its alkaloids. After taking Laudanum for pain, De Quincey wrote: "What a resurrection from its lowest depths, of the inner spirits . . . the abyss of divine enjoyment thus suddenly revealed. Here was the panacea for all human woes, here was the secret of happiness, about which the philosophers had disputed for so many ages, at once discovered; happiness might now be bought for a penny, and carried in the waist pocket." Many remarkable people became dependent on opium, including the writers Dante Gabriel Rosetti, Poe, and Coleridge, the composer Moussorgsky, and the abolitionist Wilberforce.

Following its synthesis at the turn of the century, heroin (diacetylmorphine) soon became known as the most vicious narcotic of all. At least five times as potent as morphine and capable of producing marked euphoria, heroin has become the most important factor in the international narcotics trade. Its legal use in the United States was discontinued in 1948, but its illicit use in that country has not lessened in spite of this proscription. When heroin was first introduced, it was widely discussed in the medical and pharmaceutical press as a drug that would supplant morphine because it was not depressing and not addicting. Doctors eagerly switched many of their patients to the new nonaddicting analgesic. Indeed until the Federal Pure Food Law was passed, no one knew what alkaloids of opium might be present in the most widely used medicines in the country, and the revelations that followed the passage of the Act generated much interest and astonishment. (17)

The extraordinarily wide use of the narcotics in the first decade of this century led to the passage of domestic and international legislation and agreements for the control of production and distribution of these drugs. In the United States, the Harrison Act made it illegal to buy or possess untaxed opium and opium derivatives. Suddenly the millions of people who were accustomed to using narcotics in commonly available remedies were redefined as criminals. Federal agents took over the control of addiction and a great many people, including physicians, were very harshly dealt with. Formerly addicts were female, four to one; now the ratio was reversed. Formerly addiction had had no apparent relationship to crime; now it became one of the chief sources of crime. At first, addicts were seen as sick people and about twenty clinics were opened in an attempt to help the unfortunates whose supplies had suddenly disappeared. A great many individual physicians also attempted to treat addicts as patients. But by 1923 hundreds of physicians had been arrested and imprisoned and the last clinic in the United States, an out-patient service in Shreveport, Louisiana, was closed. The medical profession had been completely excluded from the treatment of drug addiction.

This state of affairs continued until 1935 when the United States Public Health Service Hospital at Lexington, Kentucky, was opened. Once again the addict was seen as a sick man. However, the hospital at Lexington and a similar one at Fort Worth were not much different from the prisons that held other types of criminals. It would be many years before the idea was really accepted that narcotic addiction was an illness that was characterized by recurrent periods of abstinence and relapse. In the meantime the treatment of withdrawal was quite well worked out, but the underlying mental disability was by no means well understood. In the 'fifties and 'sixties, however, some extremely diverse approaches to treatment were developed.

SYNTHETIC ANALGESICS

In the years that followed the passing of the Harrison Act and the coming of federal control over narcotics in the United States, there were many attempts to develop drugs that would possess their valuable characteristics but which would not lead to addiction. Among these were meperidine (Demerol), methadone, and levorphanol or Levo-dromoran.

Meperidine is a synthetic narcotic that was introduced in 1939. For some time it was held to be an effective analgesic that was free of the risk of addiction. This is, of course, always the hope; but always, it would seem, each new ideal narcotic is found to be either ineffective or vicious. Nevertheless, meperidine or Demerol has proven to be a most valuable drug in medicine. Therapeutic doses produce analgesia, sedation, euphoria, and respiratory depression. The drug is chemically unrelated to morphine, but its effects are remarkably similar to those of the opiates. Methadone is also quite unlike morphine structurally, yet its action markedly resembles that of the opiates. Levorphanol is a synthetic chemical that resembles morphine structurally and pharmacologically. It is more potent than morphine and it is also more toxic.

There are now over 20 potent analgesics, some derived from opium and some synthetically made. All are capable of causing euphoria and all are habit-forming. Tolerance regularly occurs, and physical dependence develops with continued use.

Some of the more commonly used narcotic analgesics are Percodan or oxycodone, Hycodan or hydrocodone, Alvodine or piminodine, and Leritine or anileridine. Either optimism or greed causes the introduction of each new narcotic with hope and much sound; but invariably these new drugs join heroin and Demerol on the dangerous side of the ledger.

TREATMENT OF NARCOTIC ADDICTION

Dependence upon drugs is a result of an immense number of factors. Chemical, culture, and individual interact, and the resulting adaptation may in some cases be incorporation of a particular chemical into the life of a particular individual. This is curiously analogous to the process of physiological addiction in which bodily homeostasis is reached through cellular adjustment to the continued presence of a noxious chemical. The range of personality and of illness presented by a large group of addicts has given rise to a correspondingly wide range of approaches to treatment. Some of those that have been tried are imprisonment, hospitalization, community programs, communal projects, and a variety of individualized treatment methods. The conclusion that must be reached at this time is that no one of the current approaches to treatment can be expected to be useful with the majority of patients.

IMPRISONMENT

By the passage of the Harrison Act, the addict was classified as a criminal. As such he had to be identified, isolated from the community, and punished. In the United States the Narcotic Drug Import and Export Act and the Marihuana Tax Act provide severe penalties for importing, trafficking in, and possessing the proscribed drugs. The Single Convention on Narcotic Drugs is now adhered to by over 60 nations, and the World Health Organization reports that over 90 drugs are now under international control. These laws no doubt limited the spread of opiate addiction; but they also served to increase the price of such drugs and to insure that their distribution would be controlled by the underworld.

The expensive and illicit nature of the drugs has led to much criminal behavior on the part of a very high proportion of persons addicted to them, and imprisonment is commonly the chief response of society in terms of treatment.

Imprisonment removes the offender from the vulnerable society that he tends to contaminate. In prison he can no longer infect the public at large with his affliction. Incarceration also serves to announce that the use of illicit drugs will not be tolerated. This is felt to be a deterrent to other potential users. Finally, removal of the addict serves to protect society from further depredations in the form of the illegal activities engaged in for the purpose of obtaining goods and money to be converted into heroin.

Although much energy and money is spent on the isolation of individual addicts, these people are clearly the end point in the long system of distribution that spans the world. Opium continues to enter Hong Kong from India, Burma, and Thailand, where it is exchanged for gold. Opium continues to be grown illicitly in Asia Minor and shipped to Lebanon, Marseille, and certain Italian ports for conversion into heroin and subsequent shipment to other parts of Europe and to North America. By the time a capsule of heroin comes into the possession of an addict, the price has risen astronomically. It has been estimated that although a Turkish farmer may sell his crude opium for $23 a pound, that pound will finally yield traffickers in an American city almost $16,000. Clearly the main effort is misdirected if the street addict is the chief target of the controlling agencies.

Even so, assuming that present laws remain unchanged, it is certain that the heroin addict represents a clear and present hazard to society. A man who requires four capsules of heroin per day must pay, in Toronto at any rate, about $80 to maintain his habit, and for this purpose he will have to steal about $240 worth of merchandise. In the course of a week, about $1,700 worth of merchandise must be taken from stores or homes if the addict is to remain free of the dreaded abstinence symptoms. The addict must, in fact, be a very energetic worker in the field of crime.

For a certain number of addicts with unqualifiedly poor prognoses, imprisonment may be the only reasonable social response. Because we do not like the sound of the old despairing conclusions about drug addiction, we must not swing entirely the other way and insist, against all the evidence, that all addicts are amenable to treatment. Although other methods of treatment should be tried first, society is probably correct in protecting itself by removing from circulation those heroin addicts who are totally resistant to therapeutic approaches. Many take the view, however, that such people should not be imprisoned for possession of heroin but rather for breaking some other law in the course of their activities, and that punishment should be in accordance with the nature of the crime.

HOSPITALIZATION

If there is any hope for rehabilitation, however, the addict should certainly be handled in some way other than by imprisonment. Recognition of this was the reason for the passing in 1929 of an Act of Congress establishing the USPHS Hospital in Lexington. At the opening of Lexington in 1935, the Assistant Surgeon General of the United States said that "the isolation and separation of drug addicts and the application of medical treatment appears desirable and necessary." (18) Consequently the orientation of this hospital was a curious blend of the penal and the medical.

Most students of addiction have been discouraged by the statistics emanating from Lexington. A 95 per cent rate of recidivism was generally reported. However, with the passage of years, an extremely interesting pattern began to emerge. Of 453 patients discharged from Lexington between 1952 and 1958, 97 per cent became readdicted during the first five years. However, by the fifth year after discharge only 46 per cent were still addicted and 49 per cent were abstinent either voluntarily or involuntarily. (19) In another study covering a ten-year period, 46 per cent of persons discharged from Lexington were off drugs and in the community ten years after discharge. (20) There is no particular reason to believe that the Lexington experience had much to do with this situation. On the other hand, there would seem to be a definite tendency toward abstinence with increasing age. The life of the addict is, perhaps, too vigorous for a man in middle age.

The chief argument for enforced hospitalization at Lexington or at Matsqui in Canada is that this approach actually seems to reduce the incidence of addiction. It can certainly be shown that narcotic addiction has always been highest during periods when law enforcement was at its weakest. Before the passage of the Harrison Act, narcotic dependence was eight times higher than it is today. During World War II, when illicit supplies were especially low, the incidence of addiction dropped strikingly. Moreover, among medical practitioners who have particularly easy access to narcotic drugs, the rate of addiction is markedly higher than it is in the general population. In fact, it must be noted that, at least with respect to the narcotic drugs, strict law enforcement has held the number of addicts nearly on a level for several decades. (There is some evidence that the use of these drugs is increasing in the early 'seventies.)

David Ausubel, a strong supporter of the Lexington approach, points out that it is only reasonable to apply the same public health measures to addiction that are condoned in the handling of all other dangerous communicable diseases. Patients with scarlet fever are quarantined, smallpox is checked by involuntary vaccination, and patients suffering from tuberculosis are required to submit to isolation and treatment. When individual citizens are incapable of applying internal controls in relation to behavior that is self-destructive and socially dangerous, perhaps society has a duty to impose external restraints.

In recent years, however, there has been a trend away from the large isolated prison-hospital. Today, addicts are admitted to certain mental hospitals, to specialized addiction hospitals, and to general hospitals. In such places the emphasis is on psychotherapeutic measures. Group sessions, re-educational methods, and pharmacologic treatment are particularly relied upon even though the addict is very often an involuntary patient.

COMMUNITY PROGRAMS

Various methods are based on the observation that the addict comes from a social environment and that he must return to it. Community methods therefore attempt not only to change the patient but also to change the very environment in which he lives. Various parole services such as the Washington Heights Rehabilitation Center in New York City and the California Rehabilitation Center impose strict rules on addicts while they are otherwise free to live and work in the community. Casework in such places is informed by the special nature of the problem, and efforts are made to reach out to the addict in the community. Such projects depend upon the basic notion that drug addiction is a multifactorial problem and that the treatment methods of standard rehabilitation services or parole operations are inadequate in this specific field.

Out-patient clinics are usually more medical, more permissive, and generally less effective. Patients who are successful in this type of setting frequently have better internal controls, stronger personal motivations, and better integrated personalities to begin with. Those who lack such characteristics tend to drop out of such programs because there is typically no hold on them except a desire to trust and be trusted. Nevertheless the liberal, supportive, and medical approach characterized by most out-patient clinics is no doubt useful for at least a small number of patients.

Private medical practitioners handle a few patients, but in North America such unorthodox doctors are soon contacted by the police with the suggestion that they refer their patients to specialized clinics. Half-way houses, community rehabilitation centres, and various education centres in the large cities also contribute to this variety of treatment.

COMMUNAL PROJECTS

Several extremely interesting projects have been built on the conviction that no one can help the addict as well as another addict. In out-patient clinics there typically exists a difficult separation between staff and patients in terms of socio-economic position, education, and personality organization. The staff exists to be manipulated, disparaged, and ultimately disappointed. The patient exists to be tolerated, controlled, and ultimately despaired of. Though this is probably not a truth that can be constantly applied, it is true often enough in individual cases (on both sides of the equation) to account for some strong reactions against the clinical approach.

Synanon

The Synanon Foundation was begun in 1958 by an ex-alcoholic named Charles Dederich. Dederich has repeatedly said that Synanon is not primarily interested in curing drug addicts but that this seems to occur as a side effect of something else that Synanon teaches. Synanon is, in certain respects, an educational institution. It is based on the much-repeated idea that the addict is stupid and that he must come to believe in the total stupidity of using narcotic drugs. This he can only learn if he is exposed to an entirely ex-addict population that is completely hostile toward drug use. Thus at the Synanon house in Santa Monica, California, there are 180 former addicts all devoted to the cause of Synanon and all promoting total loyalty to the community, complete frankness, and absolute commitment to the ideal of non-use. It is a remarkable phenomenon. Just as there are no drugs at Synanon, so are there no professional workers. Every position in the organization is filled by an ex-addict.

The member lives in an apartment owned by Synanon; he works in industries owned by Synanon; he operates machinery owned by Synanon. Food and lodging are free, but the members work full-time for five dollars a week. This is, in many ways, a truly communal setting. It is also the completely non-secret society. Through the application of a curious variety of group psychotherapy known as the Synanon Game, every frailty of every member is in due course exposed. At Synanon there is no escape unless one voluntarily leaves the community. Since Synanon does not keep statistical records, it is not known how many people actually do leave or how many of these return to the use of drugs. All that can be said is that at any given moment there are about 600 members in Synanon houses at San Diego, San Francisco, Santa Monica, and in Nevada who are definitely not using drugs.

Presumably this state of affairs exists because in these settings an addict feels secure, defended from temptation, and uplifted from despair. Former patterns of living are rejected vehemently. There is an achievable status system. Violations of the norms are perceived and handled as if they were an attack on the entire group. Because such violations are a matter of life and death, the code of the street is utterly rejected. A member must inform on another member who has broken the rules. Indeed, the constant face-to-face interaction very closely resembles that of some primitive folk culture. Held thus in the network of the system, the addict feels a kind of security he has never known before.

One is inclined to conclude that for the young narcotic addict of somewhat higher than average intelligence, Synanon may well be the most successful of all treatments yet advanced. Such people, male and female, are highly receptive to the special blending of reeducation and social communality that is peculiar to Synanon and its derivatives.

Daytop Lodge is a project in New York City that is based on the Synanon experience. It began as a voluntary program serving addicts who had been placed on probation in Brooklyn, but it now accepts voluntary admissions and patients from sources other than the Brooklyn courts. The Daytop plan is very similar to that of Synanon. Hard work is honored, and every attempt at self-deception is scorned and attacked. At Daytop, the addict blames himself and not his mother, his father, poverty, society, or the police. (21) Several times a week a special variety of group therapy is conducted. At these encounters every sort of verbal violence is allowed; the meeting is relentlessly guided toward what is described as gut level confrontation.

Narcotics Anonymous

This is an organization that was founded at the Federal Hospital in Lexington, Kentucky. Some related groups are known as Addicts Anonymous. They are all based on the model of Alcoholics Anonymous; but they have clearly not been as successful as AA has been. As in Synanon, it is probably the younger, brighter, and more articulate and literate that are attracted; but unlike Synanon, there is little camaraderie. The reason for the relative failure of this approach is, no doubt, the simple fact that the addicts continue to live in the very communities that promote the use of the constantly available drug.

Inspirational Programs

Various churches have expressed an interest in the drug addict, and other interested groups such as Teen Challenge and Narcotics Anonymous have a religious basis. There seems to be no doubt that some addicts are susceptible to this kind of approach; however, at the present time it is quite impossible to say just how many are helped in this way. Religious organizations, particularly the more primitive ones, are unlikely to keep records. The result is that enthusiastic statements are made by ministers and these are zealously supported by the testimonials of converts who have accepted the life of Christ. Even so, the unrecorded work of particular ministers with individual addicts probably represents an important contribution to the overall attack on the problem of addiction.

SPECIAL TREATMENT METHODS

A number of methods remain that are difficult to classify. In general, they can be said to be specialized medical or psychiatric contributions. Hypnotherapy and psychodrama have both been used in the treatment of addiction. As with all psychotherapeutic techniques, these methods seem to be most effective with patients who are more highly educated, more articulate, and more certainly placed in the middle classes than are most drug addicts. (22)

Individual Psychotherapy

This approach depends on the widely held belief that the abuse of drugs is a symptom of underlying psychiatric illness. The goal of interpretive, insight-oriented therapy is to eradicate deep-seated personality disturbances and to promote normal maturation, or at least a much less maladaptive pattern of feeling, thinking, and acting. Unfortunately, it is generally true that the character disorders are among the conditions most resistant to psychotherapeutic intervention. Nevertheless, some addicts may be able to derive benefit from this expensive, prolonged, and frequently unsettling method.

On the whole, however, dynamic psychiatry probably has a very limited application in this field. The impulsive, socially hostile, habituated, poorly educated, unemployed, impoverished, and emotionally immature narcotic addict is not an ideal candidate for deep psychotherapy. Supportive therapy that emphasizes acceptance and the here and now, and offers direct and concrete advice and guidance would seem to have much more application in this field.

Group Psychotherapy

Many varieties of group therapy have also been used. In general it is held that the group may be mixed as to age and sex but should not be mixed as to drug of choice. For example, alcoholics and narcotic addicts do not communicate very well, and it would probably not be useful to mix non-using neurotic people with heroin addicts. There should also be a good deal of uniformity in education, IQ, and socio-economic status. Clearly, there must be a great deal of obvious structural design and an expectation of conformity and seriousness on the part of the patients. If these criteria do not obtain, the program deteriorates, there is no continuity, and any particular session becomes merely an opportunity to criticize the other patients, the clinic, the police, and society in general. Though such catharsis may indeed have an occasional place, it is not useful if it is permitted to the point at which it excludes consideration of other conflicts and problems in living.

Methadone Maintenance Treatment

This treatment was first reported in 1965 by Dole and Nyswander, two physicians in New York. By giving from 40 to as much as 180 mgs of methadone daily to the heroin addict, a state known as narcotic blockade is said to be achieved in which the patient will not desire any heroin. (23) If he should use heroin anyway, he will not be rewarded by euphoria. Research into the efficacy of this method of treatment is now being carried out by Edward Milligan of the Narcotic Addiction Unit of the A.R.F. in Toronto. It may well be that methadone maintenance will be found to be a useful method of treatment in the cases of certain highly selected patients.

Cyclazocine Treatment

Cyclazocine is said to be a specific narcotic antagonist. (24) Two milligrams daily of this drug causes the patient to be refractory to a subsequent dose of morphine. The drug is said to suppress the euphorigenic effect of and the physical dependence on morphine. Perhaps there will be a place for this drug in the treatment of some cases of narcotic addiction.

However, its use ignores the massive social and psychiatric problems inherent in every case of narcotism. The problem may well be that if cyclazocine is not as pleasant as heroin then the patient will ultimately prefer to take the more euphorigenic drug.

Chemotherapy

A great variety of tranquillizers, antidepressants, anti-anxiety agents, and sedatives has been used with drug addicts. As adjuncts to the various other approaches described here and administered under strict medical control, some of these clearly have a place. However, it should be noted that the heroin addict is vulnerable to habituation to many of these drugs. Drug dependence is a problem in his case to start with, and he has usually overused a number of drugs other than the narcotic that finally qualifies him as a patient. Very strict control is therefore essential in any replacement therapy of this type.

Other Medical and Psychological Approaches

Intensive electroconvulsive therapy (25), psychosurgery (26) and aversion therapy have all been tried. These methods have not proven to be of any value in the treatment of narcotic addiction. Carbon dioxide therapy, continuous sleep therapy, nicotinic acid treatment, thyroid treatment, hydrotherapy, and LSD therapy have also been tried. Of these, only LSD treatment ever appeared at any time to be promising in the area of the addictions. Unfortunately, no really conclusive research findings are available to suggest that its value justifies the demonstrable hazards of its use.

British Practice

The laws of England that control the possession and distribution of narcotic drugs are not very dissimilar to those that prevail in Canada and the United States. (27) However, in the U.K. the interpretation of the Dangerous Drug Regulations has encouraged private physicians to undertake the individual treatment of narcotic addicts. It has been generally accepted since 1925 that if an addict can be shown to function adequately on a regular intake of narcotic drugs, then a general physician may feel free to support the patient in this respect. In short, the British medical community has recognized that some patients may never be freed of narcotic dependence and the law enforcement agencies have not interfered with this view. (27) (28)

The consequence of this attitude has been that in England the addict has continued to be seen as suffering from a medical condition throughout the period when, on our own continent, he was seen primarily as a criminal. Interestingly, the English now seem to be moving toward the establishment of specialized clinics and the relative discouragement of individual medical treatment while we, on this continent, are progressively reaching the conclusion that addicts are, indeed, patients and not criminals.

In England the number of reported addicts appears to be increasing rapidly. In 1960 there were no heroin addicts under 20. In 1965, 145 were reported. The true incidence is probably higher than this. (29) The Brain Committee Report in 1961 referred to stabilized addicts who "if given an appropriate dose which may not need to be increased over the years nevertheless are able to lead relatively normal lives which they would be unable to do if they were not given the drug . . ." (heroin or cocaine). (30) The Brain Committee recommended the establishment of in-patient centres for diagnosis, treatment, and maintenance on narcotics for those addicts unable to accept withdrawal. This was undoubtedly a most enlightened step.

It now seems clear that it is best to treat people dependent on narcotic drugs in centres that concentrate their interest in this highly specialized field and that are staffed by addictionists who are experienced in the very wide range of approaches discussed above. These people will be more competent than the general practitioner to determine the most appropriate treatment and to carry it out.

12.

The Stimulants

The stimulants of the central nervous system that act on the sensory areas of the brain to produce alertness and to relieve a sense of depression and fatigue are typified by the amphetamines and caffeine. Those agents that act on certain vital centres lower down in the brain stem include such drugs as Metrazol and picrotoxin. Strychnine, on the other hand, has a stimulating effect on the spinal cord. Cocaine undoubtedly causes a sense of exhilaration and euphoria by stimulating the higher centres of the brain.

COCAINE

The leaves of the shrub *Erythroxylon coca* have been chewed by people living in the Peruvian Andes for at least three thousand years. The Incas considered the drug to be sacred and used it in certain religious ceremonies. Today it is said that 90 per cent of the men working in the highlands of Peru chew an ounce of *coca* daily. The plant grows at lower altitudes and is transported to the high mountains. The people of the lowlands do not seem to show significant dependence on the drug, and it is said that when a worker moves to the lowlands he usually gives up his habit. In the mountains *coca* appears to give the workers the stamina to sustain the hard climate and the burdens of heavy and extended work. This drug does not produce physical dependence. Tolerance, the tendency to have to increase the dose to achieve the same effect, does not occur. However, psychological habituation undoubtedly occurs, and when the user is deprived of his *coca* a craving for the drug persists for some time.

In Western society today the drug is no longer chewed or sniffed. It is injected intravenously. With this form of administration, snow, as it is called, causes a sudden orgasmic sensation that is felt to be intensely pleasurable. The effect is brief, however, and the habitué tends to repeat the injection several times a day. Very often it is taken in the form of a speedball, a combination of heroin and cocaine taken intravenously.

Cocaine at one time held an honorable place in medicine. In 1860 Niemann isolated the alkaloid cocaine and noted its local anesthetic properties. Freud often prescribed the drug for treatment of melancholia, and there were several claims that the drug was an aphrodisiac as well as a stimulant. As medicine progressed, however, cocaine was left with virtually no legitimate uses and was finally added to the list of narcotic drugs to be vigorously controlled by international agreements. In England the drug is still prescribed for opiate addicts who obtain their supplies of narcotics from legal sources. The rationale of this procedure is that the excitant effect of cocaine counteracts the depressant effect of the heroin.

Excessive use of *coca* as a snuff has led to perforation of the nasal septum. Intravenous overdose has caused paralysis of the vital centres of the hind brain with consequent death through respiratory failure.

CAFFEINE

Caffeine is a xanthine derivative found in tea and coffee. The seeds of the coffee plant contain caffeine. Tea leaves, *Thea sinensis*, contain theophylline and caffeine. The seeds of the chocolate plant, *Theobroma cacao*, contain the xanthine derivative theobromine.

In medicine the xanthines have been used as cerebral stimulants, coronary vessel dilators, and diuretics. Like other stimulants, they cause increased mental alertness, brighter spirits, and a loss of the sense of fatigue. As a medical drug caffeine has few persisting uses, although the compound known as caffeine and sodium benzoate is still occasionally used as a respiratory stimulant. The usual dose of this preparation is 7½ grains.

METRAZOL

This drug is a synthetic organic compound. It is a powerful stimulant to the lower part of the brain and has been used as an aid to respiration in cases of barbiturate, opiate, and anesthetic overdosage.

A few years ago Metrazol experienced brief notoriety as a way of inducing convulsions by other than electrical means in psychiatry. In the 'forties the patient was first given a small amount of the South American arrow poison curare. After his muscles were sufficiently relaxed by this drug, he was injected with Metrazol and in seconds he would show the signs of the convulsive reaction. Electrical convulsive therapy modified with succinylcholine chloride, however, soon eliminated this dangerous medical procedure.

OTHER STIMULANTS

Nikethamide or Coramine is a synthetic stimulant which has had some application in respiratory emergencies. Picrotoxin, a principle obtained from the seeds of the *Anamirta* plant, is a specific antidote in barbiturate poisoning. Strychnine sulphate is an alkaloid obtained from the seeds of *Strychnos nux vomica*. The 10 per cent mixture of *nux vomica* sold as a bitter tonic really has no further medical use. Because the drug is still used as a rodent poison, occasional incidents of human poisoning do occur either through accidental ingestion or as a result of homicidal or suicidal intent.

The strychninized person perspires coldly, and there are fine tremors of the hands and feet. Convulsive seizures follow and the head bends far back, a condition known as opisthotonus. There is intense physical pain, and consciousness is maintained as the convulsions continue until death supervenes from respiratory paralysis. The treatment of this condition is gastric lavage and the administration of one quarter of a gram of Sodium Amytal intravenously. The inhalation of ether may also be of value.

THE AMPHETAMINES

About five thousand years ago a pharmacy book was compiled in China. In it were listed numerous herbs that had been found to be useful after centuries of development by traditional Chinese medicine. One of these drugs was what was later called Indian hemp or marihuana. Another, Ma-huang, was the famous stimulant ephedrine. It is derived from the plant *Ephedra sinica.* Its use in occidental medicine did not begin until 1923 when K. K. Chen noted that the extract caused an adrenaline-like rise in the blood pressure and dilatation of the pupils.

Adrenaline or epinephrine was the first hormone to be isolated. When this was accomplished by John Abel in 1897, the particular function of the adrenal gland had already been understood for a few years. The biological function of adrenaline, the product of the adrenal medulla, was understood to be the alerting of the organism in the face of danger. For example, the cat, on being frightened, is quickly prepared for flight or vigorous defence through the direct stimulation of its sympathetic nervous system caused by the release of adrenaline. Next came the Western investigation of the Chinese herb, *Ephedra*, and then, in 1927, Gordon A. Alles synthesized amphetamine. This drug is of particular interest to us here because its discovery marked the beginning of the era of speed.

The initial excitement concerning the synthesis of these powerful stimulants had to do with the notion that the ancient disease called narcolepsy could at last be specifically treated. Narcolepsy is, in fact, a rare disorder. It is characterized by sudden overwhelming lapses into sleep by the affected person. There was no immediate recognition of the fact that these drugs could be used in medicine to combat fatigue, to reduce the appetite, or to raise the spirits.

Certainly no one recognized the vast potential for addiction when the amphetamines were first introduced. The Benzedrex inhaler was introduced in 1932, and no prescription was needed for its purchase. (31) It contained alpha-methyl-phenethylamine (amphetamine). Although a product with the same name is still on the market, this new preparation no longer contains the amphetamine fraction. Dextroamphetamine or Dexedrine, methamphetamine, and numerous other related chemicals soon followed. Collectively they came to be known as pep pills or jolly beans. In the 'forties and 'fifties, students not uncommonly took Dexedrine tablets in order to stay awake when studying late for examinations. The drugs were used by medical people to treat mild depression, and they were also used in the treatment of obesity in conjunction with dietary regimes. Hyperkinetic children paradoxically responded to these drugs with some degree of relaxation. It was during that period, also, that athletes first began to use the amphetamines; many drug-assisted records were soon solemnly entered in the books.

In general there was very little knowledge in the 'forties of the risks of amphetamine dependence. Finally, it was an extraordinary development in Japan that alerted the world to the very real hazards involved. After World War II it was discovered that the Japanese armed forces had made extensive use of the amphetamines. In the chaos that followed the defeat, huge stockpiles of these drugs were released and much of this material entered the black market. The Japanese people, dispirited and exhausted, were highly receptive. The excessive use of these drugs was first noticed in 1945, and in the decade following the end of the war the problem reached astonishing proportions. The Japanese Minister of Welfare reported in 1954 that a thousand people had been taken into custody because of offences against the Awakening Drug Control law. Estimates of the number of people using the drug ranged from 800,000 to that of the Japan Pharmacists' Association, which was 1,500,000. The users were typically young men up to 25 years of age from the lower socioeconomic classes. Another important aspect of this phenomenon was that the most common mode of administration was by intravenous injection. (32) It was generally felt that the prognosis was poor for patients with marked dependence on daily intravenous use of amphetamines.

In the meantime, use of these drugs for ostensibly medical purposes increased spectacularly in other parts of the world. In 1960 a study in Newcastle-upon-Tyne in England showed that 2,600 people in that city were each consuming 77 tablets per month. Eighty-five per cent of the patients were women and all had obtained their drugs for the treatment of depression, fatigue, or obesity. It was concluded that these figures indicated merely a baseline and that the actual use of amphetamines in Newcastle-upon-Tyne, and probably throughout the country, was much greater. However, as physicians and pharmacists began at last to become aware of the risks involved in the indiscriminate prescribing of amphetamines, the cultural upheavals of the 'sixties intervened and illicit sources began to supply an increasing demand on the part of the same people who were beginning to explore the effects of marihuana and LSD.

The extraordinary spread of the amphetamines can be used to illustrate one of the characteristics of our technological society. Because our society has tended to be pragmatic, it has honored anything that could be shown to be useful. Progress in all aspects of technology has virtually remade our culture and, as a result, we as a people have been very accepting of any new technological success. We have also had a long history of respect for the wisdom and beneficence of medicine. We have tended to reward hard work and achievement, and we have tended to retreat from physical or mental discomfort. When our celebrated technology presented us with yet another means of allaying depression, we eagerly reached out for it as a new indicator of the advanced state of our civilization. Although we are assured by the doctor, the manufacturer, and the advertiser that a given remedy is to be used in moderation and strictly for the treatment of certain identifiable medical symptoms, we nevertheless proceed to exceed the prescribed dose slightly and thereby discover the euphoria that lies beyond the limits set by the label. In doing this, we are still functioning within the cultural norms because we hold a medical prescription. Our act is one of faith in medicine. It is a part of our culture.

The result of all this has been the insidious development of drug dependence on the part of a great many people. This dependence is not of the sort that is usually so defined. It does not involve the dread marihuana or the repulsive opiates or weird and exotic drugs from the Amazon. It does, however, involve a dazzling array of mind-altering chemicals that exceed in potency most of the drugs that have been acculturated for centuries in societies that are less sophisticated technologically. The almost casual use of such drugs as the amphetamines is an excellent example of this phenomenon.

Recently we have seen the emergence of small groups that desire to go beyond the limits of oral administration. These are the people who inject the drugs intravenously and who stay awake for several weeks, do not eat, and expose themselves to malnutrition, exhaustion, and infection. The speed freak is merely a logical extension of the society that denies that to endure is any longer virtuous.

The Peruvian Indian working two miles above sea level in the Andes may chew *coca* leaves and feel he can survive the hardship of his life. The North American city dweller may sustain himself on dextroamphetamine. One respect in which the analogy between the two breaks down is in the fact that the product of Western technology is often misused with serious consequences; the Peruvian pattern of *coca* use is much less harmful. Another difference, of course, is that dextroamphetamine may be obtained at any corner drug store with the presentation of a fresh white prescription, while the unauthorized purchase of the Peruvian stimulant here can be an indictable offence.

THE APPETITE DEPRESSANTS

Phenmetrazine or Preludin was introduced in 1954. The manufacturer pointed out that the drug produced virtually no mental stimulation and that there had been no reports of significant toxic reactions to this drug.

Phenmetrazine is one of several new compounds closely related to the amphetamines. They do depress the appetite, but they probably do this by virtue of their marked central stimulating effect. In the 1960's Ritalin or dimethylphenidate, Tenuate or diethylpropion, and various phentermines have emerged as successors to the original amphetamines. However, these drugs are offered to a public already accustomed to the use of stimulants and thus the resistance to their use is extremely low. Moreover, they are usually prescribed for the most apparently innocent of reasons. The patient is overweight and he is told that the daily use of these drugs will agreeably reduce his appetite.

Preludin overstimulation is indistinguishable from that resulting from comparable doses of amphetamine.

Donald Louria has pointed out that, in 1967, 34 per cent of men in Stockholm arrested for criminal activity were regular users of Preludin. They were not arrested for possession of the drug, because the purchase of Preludin was entirely legal. The figure is given only to illustrate the fact that in the late 'sixties an undoubted episode of widespread Preludin abuse took place in Sweden. Two other aspects of the Swedish experience are of interest. The users tended to inject the drug intravenously. And there were many reports that the intravenous injection of Preludin was intensely stimulating sexually. The similarity to amphetamine use is further seen in the fact that the typical picture of the Preludin psychosis strongly resembles paranoid schizophrenia. (33)

All of these stimulants have similar effects. Given orally, they increase the blood pressure. With increasing doses, irregularities of the heartbeat may occur. There is, of course, the typical constriction of the blood vessels of the skin and of the gastro-intestinal tract. The stomach and intestine cease their peristaltic action, and the sphincter muscles contract. Glycogen stores are released from the liver, and the vessels to the muscles are dilated. The pupils tend to expand. All of these changes are typical of any stimulation of the sympathetic nervous system.

There is also a marked central stimulating effect. There is alertness, excitement, elation, and a feeling of greatly increased self-confidence. When these effects wear off, there is decreased motor activity and a sense of fatigue and mental depression. The user is then strongly inclined to take the drug again to dispel these uncomfortable states of mind. Moreover, he remembers the high experience that the drug has previously produced.

The side effects experienced by some people on being given these drugs include dizziness, headache, palpitations of the heart, and in some cases delirium. The usual therapeutic dose of amphetamine is 15 mgs, but severe toxic reactions have been seen with lower doses than that. However, enormously high doses (up to 500 mgs) have been taken by people who managed to survive. Repeated use always produces tolerance, and in the course of time huge daily intakes of the drug are possible. Doses greater than 1,500 mgs daily have been reported in habitués. These people take the drug because they desire the extraordinary alterations in perception that the drug creates at high doses. The effects are especially visual and auditory, and they tend to occur while the capacity to think and comprehend is preserved. Although withdrawal from large daily doses can result in feelings of massive depression, there are apparently no physical hazards during withdrawal and, in that sense, there is no true abstinence syndrome.

It would seem that the time has come to end the practice of introducing potent mind-altering chemicals with the pious statement that each new drug is not habituating, free of side effects, and more specific for the purpose than any previous drug. The sort of advertising that promotes the use of phenmetrazine, for example, illustrates one essential process in the creation of the chemophilic society and one which, it seems obvious, is to be deplored.

Perhaps Preludin really is an aphrodisiac. Perhaps the price the society must pay for the further pleasure of some of its members is injury to others. However, some of the reports from Sweden have suggested that once the novelty of the disinhibited high is lost and jaded sophistication rises in the throat, the once delirious seeker after erotic arousal is left feeling very bored and tired. He is curiously refractory to the ordinary stimuli of life. Once again, a glittering vehicle that carries people beyond the ancient limits of human sensation tends to leave its passengers detached, bewildered, and disillusioned.

13.

The Antidepressants

Depression of spirits is one of the most common maladies of man, and it is also one of the most varied. Depression is also virtually impossible to measure except in the crudest sense: one man's blueness may be another man's utter despair. In spite of this, heroic attempts are constantly made to classify depressions in the desperate hope that once these conditions can be fitted into a medical model then treatment, as in medicine, will become rational — based, that is, on describable symptoms of known degrees of severity and deriving from understood causes. One of the earliest attempts at a systematic approach was that of the Greek, Hippocrates, who believed that melancholia was due to an excess of black bile in the body. This theory at least provided medicine with one of its terms: *melan* means black and *cholia* is derived from the Greek word for bile.

Today we know that some mood fluctuation is normal. At times people are happy, at other times they are sad. When the mood swings up beyond the normal range, we describe the result as *euphoria*; an extreme upward swing is called *mania* or the *manic state*. If the mood swings down below the normal range, we refer to the condition as *clinical depression*; an extreme downward swing in which both mental and physical activity appear to be slowing to the point of immobility is called *retarded depression*. Frequently there is a mixture of depression and anxiety, and in such cases the term *agitated depression* is used.

Another variety of classification distinguishes between the *reactive or neurotic depression* and the *endogenous or psychotic depression*. In the former case the patient appears to be responding to stimuli either from his environment or from the effects of memory traces deriving from his past which result in feelings of unworthiness or guilt. In the latter case the cause of the great upwelling of depression cannot always be found. This is the usual form of what has been called the manic-depressive psychosis, depressive type.

In any case, the peculiar condition of mood known as depression must be seen as a symptom. Various treatment approaches have attempted to deal variously either with this symptom or with its supposed cause. If a man is depressed, in debt, and unemployed, one approach would involve his being given some chemical that would elevate his mood. Perhaps, then, he would be able to look for work. A second approach would be to ignore the symptom and deal with the superficial cause. The patient could be given a job. In actual practice, both approaches are commonly taken at the same time. Although job retraining is much in favor today, such a patient would be given an antidepressant chemical as well.

EARLY DRUGS

In the eighteenth century hellebore was given to wretched people to purge them of their melancholia. In the nineteenth century sedative-hypnotics were used to reduce concomitant anxiety, and the direct central nervous system stimulating effect of caffeine was also used. Very interestingly, *Cannabis* or marihuana entered Western medicine as a preparation that was used in the treatment of depression.

In the 1930's the amphetamines were found to be specifically stimulating chemicals. Their application in the treatment of depression was soon established. The successors to these drugs have been such newer preparations as Ritalin (methylphenidate), Preludin (phenmetrazine), and Meratran (pipradrol). These were found to be useful in the treatment of mild depression, but even as they were emerging they were being challenged by several chemicals that promised to be much more specific in the treatment of all forms of depression. For one thing, drugs such as Preludin were derived from the amphetamines and they retained their marked central stimulating effect. As such, these drugs, known as the analeptics, were held to be relatively less desirable than newer drugs that worked to relieve depressive symptoms without causing subjective feelings of central stimulation.

THE DIBENZAZEPINE GROUP

There are two groups of the newer antidepressants, the imipramine drugs (which are dibenzazepine derivatives) and the monoamine oxidase inhibitors. All of these chemicals appear to relieve depression not directly through stimulation of cortical cells but indirectly through their action on brain functions at a lower level.

In 1957 imipramine (Tofranil) was welcomed as an effective antidepressant. (34) (35) In animal experiments it was shown to be capable of reducing depression caused by administration of reserpine (an alkaloid extracted from the plant *Rauwolfia serpentina*). In the brain, imipramine potentiates the action of noradrenaline and serotonin, two naturally occurring neurohormones. Several theories have been advanced to explain the action of imipramine on the brain. If a deficiency of one or both of these chemicals in the brain is associated with depression, then the addition of a chemical that helps make use of whatever amounts are present would relieve depression. Another theory is that imipramine stimulates the brain directly, thus relieving depression through a different mechanism.

It is generally held that the dibenzazepine group is more effective than a placebo in the treatment of endogenous depressions. Until the introduction of the antidepressants in the late 'fifties, electroconvulsive therapy (ECT) had established itself as the most rapid and most effective approach to the treatment of the psychotic depressions. However, such drugs as imipramine or Tofranil seriously challenged ECT, and many workers were relieved at the propect of finally abandoning a procedure that was hazardous and that was infuriatingly empirical. The patient had to be given succinylcholine chloride as a muscle relaxant to avoid the possibility of fracture; then he had to be given a general anesthetic, usually Pentothal sodium, to protect him from the horror of experiencing respiratory paralysis while conscious; and finally the electroconvulsive treatment had to be applied. Imipramine and the other antidepressants accordingly swept through the hospitals and clinics and held their ground until they were checked by a series of reappraisals of the relative value of these several approaches.

One of the problems was that all of the newer antidepressants, including imipramine, showed a definite delay before the onset of therapeutic effect. This delay, which might well last for two or three weeks, was extremely distressing in cases of acute depression. ECT, unpleasant as it was, had an immediate effect; consequently, in the course of the 'sixties it once again became the treatment of choice for patients suffering from endogenous depression. If delay appeared to be too risky, then ECT would be used to reduce depression quickly. Antidepressants could then be used without concern about delay.

In the treatment of neurotic depression the imipramine group has been shown to be no better than a placebo, although this impression has been contradicted by the results of some research projects. Probably the only statement that can be made at the moment is that

Tofranil is an effective drug in the treatment of some, but by no means all, patients in every depressive group, and that it is especially likely to be helpful in the treatment of patients with endogenous depression.

THE MAO INHIBITORS

Certain amines, including serotonin, dopamine, and noradrenaline, occur naturally in the brain, and their presence is essential for normal function. However, another essential chemical, the enzyme monoamine oxidase, also occurs in the brain. This enzyme facilitates the breakdown of brain amines. It is believed that the monoamine oxidase inhibitors block the action of the enzyme monoamine oxidase and that this causes an increase in the concentration of brain amines. Relief of depression occurs through the stimulating effect of the amines.

At this time, four distinct groups of drugs are known to have inhibiting effects on monoamine oxidase. The hydrazines including Marsilid (iproniazid), Nardil (phenelzine), and Marplan (isocarboxazid) were discovered to be powerful MAO inhibitors as long ago as 1952, but they were not used therapeutically until much later. Interestingly, the harmala alkaloids which were referred to in Chapter 4 comprise a second group. These potent hallucinogens have been used by certain South American Indian groups for centuries. Other tryptamine derivatives form a third group; a fourth group includes the drug tranylcypramine or Parnate. Of all of these, Parnate appears to be the most potent MAO inhibitor.

As yet there is still no general agreement regarding the mode of action of these chemicals. Of the fact that they increase the concentration of dopamine, noradrenaline, and serotonin in the brain there is no doubt, but beyond that not a great deal is known. Moreover, there is still a good deal of controversy regarding the actual effectiveness of these drugs in the treatment of depression. Each of these drugs has been supported and rejected by individual studies. The consensus at the moment is that in the treatment of neurotic or reactive depression they are more effective than placebos and less hazardous than ECT. Variables such as dose, duration of treatment, the concomitant use of other chemicals and psychotherapy, and confidence in the drug on the part of both patient and physician are clearly of fundamental importance. However, they make objective comparisons very difficult. It can only be said that the antidepressants are probably of some value for some patients, but that much additional research is needed before definite statements can be made.

TOXICITY

Although the antidepressant effect of the MAO inhibitors may be delayed for several weeks, toxic effects may develop within hours of administration. There may be agitation, hallucinations, and, rarely, convulsions. Because there are many other chemicals with which it it hazardous to mix the inhibitors, the best treatment of the acute toxic reaction is symptomatic and conservative.

A number of the MAO inhibitors have been withdrawn following the development of very serious chronic effects. Thus the original Marsilid and the later Catron and Monase were all withheld because of their proven toxic effect on the liver. With all of these preparations, hepatocellular jaundice remains a hazard. Curiously, liver damage does not seem to correlate with dose or duration of use. It may be that the rapid increase in the concentration of the brain amines may account for the development of such symptoms as hallucinations and convulsions in susceptible individuals. Dizziness and vertigo and sudden drops in blood pressure while the patient is standing have also been extensively reported with all of the MAO inhibitors currently available. Moreover, because these drugs inhibit the action of brain enzymes, unexpected effects may occur with the introduction of many drugs including barbiturates, anesthetics, and stimulants. In such cases, the hypertensive crisis (a sudden increase in blood pressure within the brain) is probably the most serious effect. Certain foods, but especially cheese, may contain amines, probably tyramine, that elevate the blood pressure. These foods, in combination with the MAO inhibitors, may produce a sudden spectacular rise in blood pressure. (36)

MAO inhibitors appeared to reach their height of popularity in about 1962, but since that time an increasing awareness of the toxicity of these compounds has somewhat diminished their reputation among physicians. In England in 1965, about two thirds of patients on some sort of antidepressant received a dibenzazepine, and only one third were on MAO inhibitors. (37) (38) (39)

None of the antidepressants is as effective as ECT, at least in terms of onset of effect. In the treatment of endogenous depression, the choice will be made on the basis of urgency and the patient's attitude toward the apparently more heroic ECT. If the patient suffers from a mild depression with many neurotic elements, the treatment of choice will probably be one of the MAO inhibitors. If Nardil should fail to work, one of the other drugs, for example, tranylcypramine, may be surprisingly effective. In some cases, especially those in which there are phobias or other forms of anxiety, the combination of a MAO inhibitor and a phenothiazine tranquillizer may often be of value. (40)

Thus at the present time the dibenzazepine derivatives, especially imipramine, Elavil (amitriptyline), and desipramine are the most widely used antidepressant agents. These drugs may produce some atropine-like effects including blurred vision, dryness of the mouth, and urinary retention. There is no euphoriant effect as a rule, and the manner in which depression is reduced is not well understood. There is some depression of cognitive and affective processes, and it may be that the drugs merely dull the capacity to sense depression. However, the mechanism of action will no doubt be found eventually to be a good deal more complex than that. These drugs have been implicated in a great variety of side effects both major and minor, including the atropine-like effects noted above, the rare development of mania and hallucinations, tremors of the hand, allergic obstructive jaundice, and skin rashes. A number of workers, most recently Sereny and Olin of the Addiction Research Foundation in Toronto, have noticed the appearance of electrocardiographic abnormalities in patients who have taken the dibenzazepines for extended periods. (41)

There seems to be no doubt, however, that the dibenzazepines are effective in treating endogenous depressions and that their use is decidely less hazardous than that of the MAO inhibitors. Nevertheless, in the case of the acutely depressed and suicidal patient, electroconvulsive therapy is probably still the treatment of choice.

14.

The Tranquillizers

Although the sedative-hypnotic drugs in general undoubtedly have a tranquillizing effect on anxious people, the term *tranquillizer* has now come to be applied to a particular group of chemicals that have a depressant effect on the lower centres of the brain but only a minimal effect on its intellectual functions. No area of psychopharmacology has been as subject to the whims of fashion as that of the tranquillizers. Some of the most exciting tranquillizing drugs of the 'fifties virtually disappeared from the shelves in the 'sixties.

The basic chemical, phenothiazine, was synthesized as early as 1883. (42) It was toxic and useless, but by 1945 the curious variant known as promethazine or

Phenergan was developed, and the search for new central nervous system depressants began in earnest. One of the fixed points of the new era was established in 1950 when Charpentier synthesized chlorpromazine.

CHLORPROMAZINE

This extraordinary drug was called Largactil in Europe and Canada, Thorazine in the United States. It became the standard by which all subsequent tranquillizers were gauged. Chlorpromazine showed a remarkable tendency to inhibit the subcortical centres of the central nervous system with only slight depression of cortical activity. There is inhibition of the crucially important areas of the brain known as the hypothalamus and the reticular activating substance, which are known to integrate the central and autonomic nervous systems and the endocrine system. Nevertheless, it is quite likely that chlorpromazine does not act by affecting specific anatomical sites. It seems more likely that this drug acts by altering certain metabolic processes in the brain.

Many uses have been found for this drug. Because it has an inhibitory action on the vomiting centre of the hypothalamus, the drug has been used to control vomiting in conditions ranging from uremia to post-anesthetic and post-operative nausea and vomiting. It is said to be successful in controlling persistent hiccups as well.

However, its most important application has been in the treatment of agitation in both psychoneurotic and psychotic patients. In this field Largactil has defended itself against a whole succession of challengers, most of them its own relatives. Other drugs have appeared that have been more potent or less burdened by side effects, but chlorpromazine has created a remarkably loyal following for itself in its twenty years of life. It has been an uneasy life. In 1955 the drug was found to produce an unpleasant dermatitis in about 14 per cent of its users. Many people began reporting an increased sensitivity to sunlight. Sometimes the eruptions produced in this way were deep and persistent, but in most cases they have cleared with the discontinuation of the drug. Sometimes people who have become sensitized to chlorpromazine have developed very severe, disabling, and persistent cases of dermatitis.

A great number of other complications have appeared during the history of this drug. Various other allergic phenomena have been described, and there have been some cardiovascular complications. High and low blood pressure, and irregularities of the heartbeat have been described. The drug should be given with extra caution to patients suffering from cardiovascular disease. Because many different toxic changes in the liver have been described, including obstructive jaundice and hepatitis without clinical jaundice, the drug should not be given to patients with a history of liver disease.

Endocrine imbalances and gastrointestinal disturbances have also been reported. The central effects have included apathy, delirium, depression of spirits, and, of course, the famous extrapyramidal dysfunction (tremor and unsteadiness). The symptoms of this last disorder resemble those of Parkinson's disease with cogwheel rigidity of the limbs, tremor, drooling, and the peculiar gait disturbance. Again, these conditions all tend to clear when the dose is reduced or the drug is discontinued.

Among the most distressing and extensively reported side effects are disorders of the blood-forming tissues such as agranulocytosis. If any patient on a phenothiazine drug develops a fever or a sore throat, he should certainly have a white blood count done immediately. Any evidence of depression of bone marrow function should indicate withdrawal of the drug.

Though it has been said that 50 per cent of people treated with chlorpromazine show some sort of undesirable side reaction, the drug is clearly of great value. It is an effective tranquillizer in the treatment of the tense or agitated patient, and with caution and much adjustment of dose levels most of the heavily documented hazards can be avoided.

By now, of course, we have numerous granddaughters of chlorpromazine. All of the cautions noted above must be applied to all of them.

Promazine hydrochloride or Sparine is identical to Largactil except that it lacks the chlorine atom. This is the sort of situation that astonishes people who are not chemists. This one apparently minimal change in the structure of the chemical produces a drug that is less acutely toxic and about one quarter as potent as chlorpromazine pharmacologically. Yet with promazine there has been a higher incidence of toxic confusional states and seizures.

Trifluopromazine or Vesprin is useful in the management of very agitated patients. It is about five times as potent as chlorpromazine. As might be expected, it has been implicated in all of the side effects noted for chlorpromazine.

Mepazine or Pacatal has been found to be useful in manic states, some forms of schizophrenia, and, of course, in conditions where anxiety is marked. Again the blood disorders, the liver effects, and the extrapyramidal symptoms have been a problem.

Prochlorperazine or Compazine is five times as potent as chlorpromazine. This drug has also been used in the treatment of severe psychotic disorders. In particular, it seems to reduce psychomotor agitation and excitement. The patient becomes less aggressive, and hallucinations and delusions are diminished.

With the widespread use of all of these chemicals, the atmosphere inside mental hospitals has changed beyond recognition. Indeed it could be said that some time in the 'fifties the open ward became a possibility. The tranquillizers have also made welcome inroads into the realm of electroconvulsive therapy, and they have eliminated the dreadful procedures of cold wet packs and continuous baths.

Perphenazine or Trilafon has emerged as a particularly useful drug. It is about ten times as potent as chlorpromazine and two thirds as toxic as that drug. However, because this drug is so very potent, it is essential that the lowest possible dose be used. Extrapyramidal symptoms have become progressively more marked and incapacitating with each increase in dose. Side reactions include drowsiness, gastric distress, and a feeling of weakness. They tend to clear when the dose is reduced.

By now there are a great many phenothiazine tranquillizers. They are undoubtedly useful drugs, but they are being overused. Eight per cent of all the prescriptions written in Toronto in 1966 were for tranquillizers. (43) They present a curious problem to the addictionist. They do not seem to create physiological addiction. Nor are they habituating in the sense that a marked craving develops when they are discontinued. They do not create euphoria or any state of mind that would be described as high. They tend to be used by people who are tense and anxious, and the fact that they actually do work to reduce such states of mind is the basis on which dependence can develop. These drugs do not solve the emotional problems of the patient; they merely palliate them. It follows, then, that when the effects of the drug wear off the symptoms tend to recur. The patient remembers the relief that the drug afforded and thinks in terms of gaining this relief again. In this way thousands of people have continued to take these drugs just to stay at ease for very extended periods of time. Some people have steadfastly clung to a phenothiazine for many years whether they needed tranquillizers or not. The drugs, in this sense, are undoubtedly habit-forming.

OTHER PHENOTHIAZINES

The phenothiazines may be classified in three groups. These are the aliphatics, the piperazines, and the piperidines. The aliphatics such as the prototype chlorpromazine have marked sedative properties. Another drug in this group is methotrimeprazine or Nozinan. Drowsiness, constipation, gastric irritation, blood disorders, and liver injury are among the hazards of aliphatic administration.

The piperazine group includes such drugs as fluphenazine or Moditen, perphenazine or Trilafon, and trifluoperazine or Stelazine. These drugs have antiemetic properties, but they also have a marked tendency to produce extrapyramidal effects such as the symptoms of Parkinsonism.

Thioridazine or Mellaril is an example of the piperidine type. Hypotension, sexual dysfunction, and ocular pigmentation may occur with drugs in this group.

MEPROBAMATE

The brief and furious history of meprobamate (Miltown, Equanil) should be very instructive.

Meprobamate was synthesized by Ludwig Piech in 1950 on the basis of the early muscle relaxant mephanesin. This drug has a marked calming effect on patients with abnormal muscular hyperactivity. Moreover, its action persists much longer than that of mephanesin. Its low toxicity was the cause of its eager acceptance at the outset. Four hundred milligrams of the drug would be given three times a day to a patient, and the result would be gratifying relaxation. The drug was soon being marketed without restraint. It was possible to buy meprobamate in the early 'fifties without a prescription.

Very soon, however, it was observed that the calming effect involved more than the muscles of the tense patient. There was an hypnotic effect not dissimilar to that produced by the barbiturates, and people began using Miltown not only to feel tranquillized during the day but also to sleep at night. A drug with such characteristics was certain to engender dependence, and this is precisely what was seen in the following years. It was used extensively as a replacement for alcohol in the excessive drinker. It was used to replace the barbiturates in the case of the patient dependent on such drugs. The result, of course, was the emergence of a new and important drug of dependence.

Along the way, various other side reactions began to be reported. Allergic skin reactions and purpuras (hemorrhages into the skin) were seen. Such cardiovascular symptoms as dizziness, episodes of low blood pressure, and fainting were noted. Gastrointestinal disturbances were complained of. Then the serious issue of addiction became very clear indeed. It was discovered that tolerance rapidly developed with patients on meprobamate. Cases in which up to 7,000 mgs daily were being ingested began to be reported, and sudden withdrawal was shown to result in convulsions. Indeed, withdrawal from meprobamate was very similar to withdrawal from the barbiturates. Occasional reports of mental excitement were published. Meprobamate began to be implicated in suicide. Overdosage would result in coma, shock and, in very severe cases, vasomotor collapse and respiratory failure. Finally, the famous emotion known as euphoria was seen in relation to the use of this drug. If a lower dose would not produce the ecstasy, then perhaps a higher dose would. In short, every element in the description of drugs capable of producing dependence was finally seen. It was also observed that the mixing of meprobamate with other drugs, including alcohol, would produce degrees of intoxication altogether surprising to the patient on the basis of his ordinary experience with either of these drugs alone.

Meprobamate is one of the very important chemicals of our time. It is one of the essential elements in our complex, drug dependent society. It is a mild muscle relaxant, inebriant, hypnotic, and euphoriant, and it is very freely available — though it can no longer be obtained legally without a prescription. The population has little respect for it, and it is widely held to be a gentle minor tranquilizer. It works, the dose increases, it works again; and dependence is the result.

THE DIPHENYLMETHANE DERIVATIVES

Benactyzine hydrochloride or Suavitil was synthesized in 1936. It is a curious drug. It appears to reduce autonomic reactions to emotion, and hence the user feels emotionally and physically relaxed. The sources of stress remain, but now there is a barrier between the user and these sources, and he no longer reacts. He feels aware but he is no longer irritable.

This, at least, is what was held to be the case in the early 'sixties. Since that time extensive clinical trials have failed to produce any convincing evidence that this drug, alone or in combination with meprobamate, alleviates depression or anxiety. (44) (45)

However, this drug should be noted for another reason altogether. It is twenty times more potent than Largactil as a parasympathetic nervous system depressant, and thus its atropine-like effects may be quite marked. It also produces apathy, a sense of unreality, and a diminished ability to concentrate. Moreover, some visual perceptual changes have been reported. (46) (47)

Hydroxazine hydrochloride or Atarax is another chemical related to benactyzine. It is very similar to some of the antihistamines. Although it is said by some workers to have a tranquillizing effect, the consensus now seems to be that it has only a mild hypnosedative effect and is of very limited usefulness in the treatment of anxiety states. Euphoria does not seem to occur, and the possibility of psychic dependence is probably not great. As with most of these drugs, physicians are warned that Atarax will potentiate the action of alcohol, the opiates, and the barbiturates. The drug should not be used with the MAO inhibitor antidepressants or with the phenothiazines. And, of course, the patient is warned not to engage in activities in which mental alertness is essential.

THE UREIDES AND AMIDES

Ectylurea or Nostyn is described as a quieting agent. Early reports seemed to suggest that this drug had a very low toxicity and that it was an effective sedative with few side effects. Such reports should make us very suspicious on the basis of our experience with other chemicals similarly introduced. (Ectylurea produces only a mild depression of the central nervous system, but we must remember that if a drug actually works clinically to relieve tension then it is, by definition, habituating.) The drug is used in the treatment of mild anxiety in adults and hyperexcitability in children. In a dose range of 50 to 150 mgs it is said to induce an overall calming effect which makes the patient more amenable to other activity and treatment approaches. The side effects of this allegedly mild, non-habit-forming, safe, and effective tranquillizer are dizziness, drowsiness, headache, occasional skin rashes, and loss of appetite.

Oxanamide or Quiactin is a calming agent with a central depressant action that somewhat resembles that of the short-acting barbiturates. It is, however, about one fifth as potent as these drugs. The usual dose is one 400 mg tablet three times a day. The drug has been used to treat insomnia and mild daytime anxiety states. It is said to be of very low toxicity, and to be a normalizer for the anxious, irritable, restless person. It is also considered to be of great value in the treatment of psychogenic dermatological cases.

RAUWOLFIA ALKALOIDS

For thousands of years traditional medical practitioners of India have made medicines from the roots of the plant *Rauwolfia serpentina.* Such preparations were used to treat snake bite and other conditions in which the plant would be of questionable value; but they were also used to reduce the hyperactivity of mental disorders.

Rauwolfia was introduced to the modern world in 1933 by Indian workers who reported that it had a marked tendency to lower the blood pressure. During the 'fifties various alkaloids were extracted from the plant and two of these, reserpine or Serpasil and recanescine or Harmyl, became very important. These drugs were used in the treatment of anxiety and in the care of psychotic patients. For a brief period of time intense interest was shown in the *Rauwolfia* alkaloids, but with increasing reports of agitation or paranoid depression, Parkinsonism, endocrine imbalance, and cardiovascular collapse, these drugs passed from fashion. Perhaps this would not have happened had not other tranquillizers, notably the phenothiazines, swept the field.

THE DIAZEPINES (LIBRIUM, VALIUM, ETC.)

The desire for relief from the tensions of life persists and is becoming intensified. The drugs used to achieve such tranquil states are usually introduced with much fanfare and are anxiously tested by anxious people. It would seem that very few of these drugs are able to take permanent places in the defence against discomfort. Obviously, many of the phenothiazines (Largactil, Trilafon, and Stelazine, for example) have been successful. Meprobamate remains in the field in spite of numerous attempts to dislodge it. Such drugs at Quiactin, Nostyn, and Suavitil have passed out of common use. The alkaloids of *Rauwolfia* have largely been given back to Indian traditional medicine.

New drugs are continuously introduced to the scene to undergo the same triumph and condemnation experienced by their predecessors. In a very general and misleading way these new drugs are classified in one of three groups. The major tranquillizers are such preparations as the phenothiazines. They are primarily used to reduce the hyperactivity and aggressiveness of disturbed mental patients. It is these drugs that have changed the character of the mental hospitals. The second group, the minor tranquillizers, is typified by Miltown. Atarax, Quiactin, and Trancopal are also minor tranquillizers. In the last few years the diazepines (Librium, Valium, and related drugs) have made a dazzling entry into this field. (Some people would include Doriden in this category, but this drug [with Placidyl, Valmid, and Noludar] has here been considered in the section dealing with sedative-hypnotics.)

The third group is composed of drugs that may be obtained without a prescription. They have a mild calming effect and are sold over the counter with enticing names that promise relief from anxiety. They usually contain one of the more sedative antihistamines. For example, Cope contains methapyrilene fumarate, aspirin, caffeine, and two antacids. Compoz will be touched on later in the section on over-the-counter hallucinogens.

CHLORDIAZEPOXIDE (LIBRIUM)

When this drug was introduced it was described as a specific anti-anxiety agent. It was said to be virtually free of side effects and, of course, it was not habit-forming. By now, one would hope, we are all too sophisticated to be convinced by the early rhapsodic description of any new drug. Still, it must be admitted that chlordiazepoxide or Librium is a useful calming agent in pre-operative tension, premenstrual distress, tension headache, some behavior disorders in children, and indeed any condition in which mild anxiety is the central symptom. The average adult dose is 20 to 40 mgs daily. Drowsiness, skin eruptions, dizziness, and nausea are among the side effects occasionally reported. The ingestion of the average dose does not seem to produce physiological dependence, but there is no question whatever that the drug is psychologically habit-forming. (48) Because it affords relief from tension, the anxious patient responds with gratitude and renewed devotion to such a beneficial agent. This is the essence of habituation.

Some tolerance develops with chlordiazepoxide, and daily doses as high as 600 mgs have resulted in withdrawal symptoms on discontinuation of the drug. These symptoms have been mental depression, nausea, agitation and, occasionally, grand mal seizures. (49)

The manufacturers note that the user should abstain from alcohol. Although it is not yet quite clear the extent to which Librium potentiates the action of alcohol, this effect is now held to be likely. Because both Librium and alcohol are commonly used by millions of people, the Librium factor in alcohol-induced car accidents may be significant. (50) The drug also should not be used in the presence of kidney or liver dysfunction or in combination with phenothiazine tranquillizers or MAO antidepressants.

In summary, it can be said that this exceedingly popular drug is a muscle relaxant and an anticonvulsant. In the treatment of psychoses and the depressions it is of no value, but in cases of mild anxiety it appears to be somewhat more effective than a placebo. (51) (52) Though the pharmacologic effects differ markedly from those of the barbiturates, the clinical effects are not dissimilar.

DIAZEPAM (VALIUM) AND OTHERS

Several new drugs related to Librium have been developed in recent years, and some of these have proven to be of value.

Valium (diazepam) is about three times as potent as Librium as a muscle relaxant and tranquillizer. (53) Accordingly, it has been used extensively by people who have felt their anxiety escape from Librium. Except in terms of potency the drug behaves much as Librium does, and the same hazards surround its use. As a temporary replacement drug in the treatment of alcoholism, it appears to be much more effective than Librium. Oxazepam is not more useful than Librium (54) but Nitrazepam may be as effective an hypnotic as the barbiturates. Its greater margin of safety is therefore of great interest.

BRAVE NEW WORLD

The extraordinary spread of the tranquillizers, major, minor, and over-the-counter, is the clearest indication of the tendency in our society to seek chemical solutions to emotional problems. Already in one metropolitan area 32 per cent of all prescriptions written are for mind-altering drugs. (43) It would seem that we are rushing toward the invention of the drug that Aldous Huxley called soma. It is faintly amusing to note that a brand of the muscle relaxant drug carisoprodol was named Soma a few years ago. No doubt the name was chosen to indicate the drug's effect on the soma or body of the organism. Even so, Horner's Soma can cause lassitude and habituation because it undoubtedly does have a central depressant effect.

The Vedic hymns describe the use of the ambrosial drug soma, but they do not describe its source. Moreover, the Hindu soma was used to facilitate meditation and the achievement of the transcendental state. In *Brave New World,* Huxley gives all the dull, working people soma, not so that they will achieve enlightenment but so that they will be peaceful and unambitious. The tranquillity and security of Huxley's fictional society depends on the docility of its masses.

Among the numerous threats to our society at the moment, one must surely count the inexorable advance toward the perfection of the ideal tranquillizer. It will not be Horner's Soma nor will it be meprobamate. It will not be the Aryan soma, either, if Wasson is correct in believing that that drug was in reality the hallucinogenic mushroom *Amanita muscaria.* Rather, it will be a drug that prevents the user from interpreting as threatening, stimuli either from within or without. Perhaps we could call this magical drug Panaceazine. In spite of the persistence of turmoil, the man on this glorious drug will remain calm and happy. He will, in fact, be a vegetable.

There are signs that this is the road we are hurtling along at the moment.

15.

Over-the-Counter Drugs

The nervous system of man consists of the brain, the spinal cord, the peripheral nerves, and the two great autonomic systems, the sympathetic and the parasympathetic. Closely integrated with these is the endocrine gland system, the various parts of which release hormones into the blood stream.

These complex systems are extremely well coordinated within themselves as well as with the function of the other parts of the organism. Balance or homeostasis is maintained through the operation of a great variety of chemical and electrical controls. Imbalance through disease or through the intrusion of some environmental influence is counteracted by myriad adjustments within the organism. Indeed, the symptoms of disease, both mental and physical, may be seen in some sense as evidence that imbalance exists and that processes that tend toward homeostasis are in operation.

The introduction of a drug will cause symptoms of both types. First, there will be the toxic effect of the alien chemical itself; second, there will be the symptoms of bodily compensation. Eventually either the drug is broken down and excreted (as in the case of Aspirin, for example) or the body adjusts to the continuing presence of the drug and achieves balance through sheer incorporation (as is frequently the case with morphine and other drugs that can produce physiological dependence). If a drug which has been incorporated into the system is discontinued, homeostasis is violated and symptoms of abstinence appear.

It is becoming quite clear that many drugs act by affecting in some way the autonomic nervous system, the mid-brain or diencephalon, and the endocrine glands. It may be instructive to consider some of the naturally occurring chemicals that form essential links in the transmission of impulses within this system.

The sympathetic nervous system is stimulated when an animal becomes aware of danger. At such times, the hormone adrenaline is introduced into the blood stream by the adrenal glands and impulses are passed to those parts of the body that are supplied with sympathetic nerves. At the point of contact with the cells a substance known as noradrenaline is released, and without this event the impulse would not pass. The sympathetic system is described as *adrenergic*.

Both divisions of the autonomic nervous system are composed of two neurones, the pre-ganglionic leading to the synapse (impulse transmittal point) and the post-ganglionic leading from the synapse to the organ to be affected. In both systems the transmission of the nervous impulse requires the discharge of the chemical acetylcholine at the synapse. In the parasympathetic division, acetylcholine is also discharged at the site of contact with the effector cell (the part of the body which will react to the nervous impulse). This division is therefore described as *cholinergic.*

The amphetamine drugs (dealt with in the chapter on stimulants) are *sympathomimetic* amines. This means that this group of drugs mimics the action of the crucial adrenergic hormone epinephrine or adrenaline. Ephedrine is another sympathetic stimulant. Neo-synephrine is still another. Such drugs will generally cause an animal to be ready for quick escape or vigorous defence. The blood pressure rises, the pupils dilate, the bronchioles of the lungs are distended so that there is a freer passage of air, the gastrointestinal tract is inhibited, and the heart beats more quickly. Glycogen is released from the liver, and the vessels of the muscles are dilated to receive this source of quick energy. The animal becomes alert and prepared for battle. All stimulants create such states. In excess, they lead to extended sleeplessness, mental confusion, and finally hallucinations. There are also a number of drugs, such as the sympathetic nervous system depressants ergotoxine and ergotamine, that inhibit the action of the adrenergic system.

Opposing adrenaline in quite another sense are the various drugs that stimulate the parasympathetic nervous system. The two great systems frequently supply nerves to the same organs, but they tend to act in opposition. In this way the essential homeostasis can be maintained. The most important drug in the parasympathetic division is, as we have seen, acetylcholine. However, the alkaloid extracted from the fly agaric mushroom, muscarine, is also in this group. Pilocarpine and prostigmine must be listed here as well. In the chapter on chemical warfare further mention will be made of prostigmine and of physostigmine, another cholinergic drug. All of these cholinergic drugs tend to produce cardiac inhibition, dilatation of the vessels of the skin and the gastrointestinal tract, and contraction of skeletal muscle. Blood pressure falls, pupils constrict, and breathing becomes less easy. The gastrointestinal tract is activated. Presumably the animal is safe, eating, and at rest when this system is stimulated.

Finally, there are also parasympathetic nervous system depressants. Thus such drugs as atropine antagonize the action of acetylcholine. Hyoscine, hyocyamine, and homatropine are all powerful parasympathetic antagonists. It is this group of drugs that will particularly interest us here.

THE BELLADONNA ALKALOIDS

Plants containing the powerful alkaloids atropine and scopolamine occur very widely in nature. As has been noted in Chapter 5, the American Indians were very familiar with the jimson weed, *Datura stramonium*. This plant is also known as the thorn apple and stink weed. It contains l-hyocyamine and the d-l form of the same drug, which is known as atropine.

Atropa belladonna, or the deadly nightshade, contains these two drugs as well. This plant has had a very long association with Western culture. In Greek mythology the three fates were Clotho, Lachesis, and Atropos. The role of the third fate was to sever the thread of life and thus Linnaeus, who first described this deadly plant, named it in her honor. *Hyocyamus niger,* or henbane, contains the drug 1-hyoscine; this alkaloid is also known as scopolamine.

These drugs are known as the belladonna alkaloids. This term, which means beautiful woman in Italian, derives from the very ancient use of eye drops of atropine to cause wide dilatation of the pupils, a sign of beauty and one of the striking anticholinergic effects of these drugs. There are many others. Acetylcholine slows the heart; belladonna abolishes this effect. Acetylcholine causes dilatation of the superficial vessels of the body; belladonna abolishes this effect as well.

In opposing the parasympathetic nervous system, atropine produces in a curious and distorted way some of the actions of the sympathetic nervous system (which also opposes the parasympathetic). The blood pressure rises and the bronchioles of the lungs dilate; atropine will tranquillize an overactive gastrointestinal tract. A dose of 4 mgs of atropine will stimulate the cells of the cerebral cortex. The user becomes talkative and disoriented and may experience hallucinations. This cortical stimulation continues to the point of exhaustion and this state is followed by depression, stupor, and coma. Although there is an initial stimulation of the respiratory system, repeated doses will produce death from paralysis of the higher respiratory centres.

Scopolamine closely resembles atropine in its effects as a parasympathetic blocking agent, but it is less potent. Both drugs dilate the pupils and cause a marked drying up of the secretions of the nose, mouth, and upper respiratory tract.

The central effects of scopolamine include euphoria and bodily fatigue. Occasionally restlessness, delirium, and hallucinations may occur. Because of the central depressant effect, scopolamine has sometimes been used as an hypnotic and in the treatment of delirium tremens. However, the dose in such cases is very low. Atropine, on the other hand, has a more consistently stimulating effect on the brain even with very low doses.

Now on considering the foregoing, one would perhaps conclude that such drugs as atropine and scopolamine would be kept under strict control. Such is strikingly not the case. The belladonna alkaloids are used widely in medicine, and they may be obtained in various preparations by prescription. Also, there are numerous proprietary drugs containing belladonna alkaloids available without a prescription wherever over-the-counter drugs are sold. Most of these preparations contain the antihistamine, methapyrilene hydrochloride. They also contain scopolamine. San-man contains 0.25 mgs of scopolamine hydrobromide and 25 mgs of methapyrilene hydrochloride. Sominex contains 0.5 mgs of scopolamine hydrobromide, 50 mgs of methapyrilene hydrochloride, and 200 mgs of salicylamide. Sleep-eze, Sleep-Tite, Neo-nyte, and Devarex all contain scopolamine and methapyrilene. All of these preparations are sold as over-the-counter sedatives. There is no reason to doubt that they work. However, obvious hazards derive from the fact that these ancient drugs, once listed with the most romantic of the deadly poisons, are now freely available in a society obsessed with the need to experiment with drugs. More and more cases of atropine and scopolamine poisoning are appearing. Whereas the 0.25 mgs of scopolamine in Sleep-Tite is benign and agreeably hypnotic, the 4 mgs that would be taken by a child who swallowed 16 of these tablets might well be toxic.

There are still other over-the-counter preparations that must be mentioned. The cold tablet, Contac, contains 0.2 mgs of belladonna alkaloids to dry excess secretions, 4 mgs of the antihistamine chlorpheniramine maleate, and 50 mgs of the sympathomimetic drug phenylpropanolamine hydrochloride. Donnagel, which is used to combat diarrhea, contains 0.1 mgs of hyocyamine sulphate, minute doses of atropine and hyoscine, sodium benzoate, pectin, and alcohol. Travel-eze is used to counteract motion sickness. It contains hyocyamine hydrobromide and pyrilamine maleate. An over-the-counter preparation called Asthmador has recently become quite fashionable among people who are looking for new highs. The powder that is supplied is to be burned and the smoke is to be inhaled. As few as four Asthmador cigarettes have been known to cause toxic symptoms. Asthmador contains from 0.23 to 0.31 per cent alkaloids of belladonna and stramonium.

The signs of belladonna alkaloid intoxication are dryness of the mouth, thirst, and difficulty in swallowing. This is followed by rapid beating of the heart, dilatation of the pupils, and blurred vision. Sweating is inhibited and the skin becomes dry and hot through dilatation of the peripheral vessels. The temperature accordingly rises. This is followed by slurred speech, unsteady gait, confusion, and agitation. Hallucinations, usually visual, may follow. This state, which may follow the ingestion of from 3 to 8 mgs of scopolamine, may persist for up to 36 hours. Sometimes an underlying psychosis may be unmasked by this experience and the symptoms of this psychosis will persist long after the toxic effects of the drug have disappeared.

In view of the increasing incidence of acute poisoning with the belladonna alkaloids, it would seem that these over-the-counter preparations now require control by prescription. (55)

LAXATIVES, VITAMINS, THE PILL

In any drugstore, supermarket, or corner variety store, thousands of other proprietary medicines are available. Although this book is particularly concerned with those drugs that have some effect on the central nervous system (the psychoactive drugs), it is important to note that habituation can undoubtedly occur with at least a few drugs that have no effect on the central nervous system whatever. It may seem odd to include the laxatives in a book on psychoactive drugs, but I do so because I feel this group of drugs can be used to illustrate certain important characteristics of our society.

The use of purgatives in medicine is the one remaining procedure of five great methods of treatment that were practised for centuries. These were leeching, diaphoresis (production of excessive sweating), emesis (production of vomiting), bleeding by venesection, and violent purgation. In one way or another, the physician was bound to cleanse the patient of whatever evil humors polluted his body. Today only the belief in purging remains, and though physicians have generally rid themselves of their former dependence on this approach to treatment, laymen have not, and in this field self-prescribing is the rule.

Perhaps the excessive use of laxatives made some sense at one point. The Elizabethan Englishman, for example, ate very few vegetables. His diet was composed largely of meats, pastry, and wine; constipation must have been common. In any case, he would often "retire for physic," and he took enemas frequently. The first step in the treatment of most diseases was the administration of a powerful purgative, usually the salts of antimony or mercury (calomel). (56) To go farther back, the ancient Egyptians believed that to take a cathartic once every two months was essential to life, and throughout the Middle Ages the notion of autointoxication persisted and grew to monstrous proportions. Today the superstition continues and is strongly reinforced by advertisers with a bit of psychology in their education.

This is not to say that there is not some justification for the occasional use of laxatives. The sedentary life and the use of certain drugs that inhibit the action of the intestinal tract (codeine, for example) do promote constipation. For the greatest number of people anxiously depending on laxatives, however, no such medication is necessary. Theirs is a psychological need and not, in most cases, a physical one.

Though occasionally a person who gives himself a laxative when he experiences abdominal pain discovers later that he has a ruptured appendix, in general it may be said that the excessive use of laxatives is not physically dangerous. It is just that it is not necessary. I have mentioned these drugs because they illustrate a tendency in our population toward abusive self-medication.

We are increasingly unable to live without anxiety, and chemical deprivation is abhorrent to us. We are urged through the persistence of ancient superstition and personal hypochondriasis to treat any indication of abnormal function. Most of this book has been devoted to the control of unpleasant states of mind such as depression and anxiety, and the feeling that one is constipated and that horrid poisons are accumulating in the system can certainly be one source of anxiety for many people. In such cases the home remedy is less likely to be Librium than Epsom salts, on the ground that it is felt to be everyone's right, somehow, to retain one small medical practice of his own. As a result, purgatives are the drugs of choice for many people, and they are as freely used by today's laymen as they were by the benighted physicians of medieval Europe. Perhaps we should rejoice that home blood-letting has lost its popularity.

Vitamins, also, are used voluminously and needed rarely. They are eaten by a people convinced that there is no harm in excess and that possibly some occasional good might lurk there.

Vitamins are big business and a waste of money. Some are presented to the public in fluids that just incidentally also contain up to 18 per cent alcohol. Frequently salicylates, antacids, and assorted other chemicals common in over-the-counter preparations are added for the shot-gun effect now so much in favor in our society. It is probably reasonable to suggest that supplementary vitamins and minerals need not be taken except on the advice of a physician.

In a book on mind-altering drugs the inclusion of a reference to THE PILL may be illegitimate. Yet this, at least as much as other drugs dealt with in this book, is altering the very structure of our society. Contraceptive pills are accomplishing this by virtue of their effects on human thinking, feeling, and acting. It is irresistibly tempting to observe that the drug that is perhaps the most socially influential of all is one that entirely lacks the power to intoxicate. Yet its devotees number in the millions, and every one of them takes it every day. If they should fail to take their drug on any day, they become anxious and depressed. Thus we have abstinence symptoms though, it is true, no tolerance appears to develop. The drug confers a sense of security and ensures the persistence of the status quo.

It is a great pleasure to report that the habitual use of at least some drugs does not signify habituation.

16.

The Hallucinogens in Medicine

The hallucinogens are, of course, well known as sources of religious ecstasy and secular mind expansion. These drugs are also interesting from the medical point of view because they contribute to the study of brain function, and some of them are medically significant in the treatment of human ills.

The ideal hallucinogen, presumably, would be one that produced distortion of thought, perception, and mood without disturbing in any way the operation of the autonomic nervous system. It has long been clear, however, that none of the known hallucinogens satisfies this criterion. Undoubtedly this is because these drugs produce their effects on the functioning of the brain by interfering with the complex system of neurohormones and enzymes in the brain and elsewhere.

MENTAL DISEASE AND BIOCHEMISTRY

There are in the brain at least eight naturally occurring neurohormones that are essential for its normal functioning. Several of these have already been discussed. In addition to the sympathetic nervous system stimulants adrenaline and noradrenaline, there are adrenochrome, serotonin, histamine, dopamine, acetylcholine, and gamma-aminobutyric acid. In the course of numerous attempts to establish a biochemical basis for mental diseases, it has been suggested that some of these diseases might appear as a result of an excess or an insufficiency of one or more of these neural hormones; and ever since it was first noted that mescaline and LSD could create psychotic symptoms, the complex relationships between the hallucinogens and the chemicals occurring naturally in the brain have been of great interest to medical researchers.

The *psychotomimetics,* as such hallucinogens were called, were at first believed to be capable of mimicking the symptoms of schizophrenia, but this idea has now been for the most part abandoned. Although the two conditions undoubtedly have much in common, it is now recognized that there are significant differences between drug-induced and naturally occurring psychoses, and that schizophrenic patients given hallucinogens appear to have no difficulty distinguishing between the effects of the drug and the experience of schizophrenia.

In a naturally occurring psychosis, fewer than 5 per cent of patients have visual hallucinations, whereas these are nearly universal in drug-induced psychoses. Schizophrenic hallucinations, when they occur, are usually auditory; concomitant disturbances of perception are rare. They appear to be, moreover, a direct result of delusional rumination. In both types of psychosis, there are mood disturbances, delirium, and alterations in modes of thinking and acting, but these are comparatively brief in drug-induced conditions. Also, the patient with a drug-induced psychosis retains some insight into the cause of his condition, whereas the true schizophrenic does not.

Although the drug-induced psychosis may still be of interest, of much greater importance is the fact that the hallucinogens interfere with the action of the brain neurohormones. LSD has been shown to antagonize the action of serotonin. Other psychotomimetics such as the harmala alkaloids and yohimbine also are antiserotonin in effect. It was discovered further that these substances and also psilocybin, bufotenine, and ibogaine all contain the identical tryptamine residue present in 5-HT or serotonin. Moreover mescaline and the neurohormone adrenochrome are also remarkably similar to one another. Finally, the amphetamines closely resemble adrenaline.

Now these tantalizing bits of information do not yet indicate a solution to the mystery. Remarkable interrelationships certainly do exist among the many chemicals that affect brain function, but their significance is by no means clear as yet.

However, it was because of this series of observations that theories developed in which drug-induced psychoses and naturally occurring psychoses were held to be similar and both to be due to some alteration in the amount of serotonin in the brain. These theories have not, as yet, been proved. In any case reserpine, which is known to cause depression, can reduce the concentration of 5-HT in the brain. It has been suggested that 5-HT excites or stimulates the brain's cells in the brief period of time after it is formed from its precursors and before it is oxidized by monoamine oxidase. In the section on the antidepressants it was noted that the MAO inhibitors prevented the breakdown of such brain substances as noradrenaline and serotonin and it was postulated that this might account for their antidepressant effect. This theory is by no means proven to be true as yet, but at least there seems to be no doubt that serotonin plays some part in the maintenance of mental stability and that LSD and the other hallucinogens are antagonistic to this neurohormone.

Acetylcholine is essential for the transmission of nerve impulses across synapses. A number of substances are known that inhibit the action of acetylcholine. These include the belladonna alkaloids atropine and scopolamine. The hallucinogenic effects of these drugs was discussed in the last chapter. (Following the discovery that the piperidyl glycolates [benactyzine] were psychotomimetic, it was found that these substances were powerful anticholinergic drugs.) Nevertheless, the actual part played by acetylcholine in the causation of mental illness is not known as yet.

It is known that adrenaline and noradrenaline are structurally very similar to mescaline and that the tranquillizers reserpine and chlorpromazine antagonize the action of all of these substances. One of the biochemical theories of mental illness, that of Abram Hoffer of Saskatchewan, suggests that adrenaline is oxidized to adrenochrome and that this substance, mildly psychotomimetic, undergoes further alteration to become a potent hallucinogen in the body. In this way the symptoms of schizophrenia might appear spontaneously.

All of these theories are tantalizing but none of them is complete. There are, as yet, too many missing links in the necessary chain leading from normal brain function to mental illness. However, the effects of the hallucinogens continue to be of the greatest value in the search for solutions to this mystery.

FOUR TYPES OF HALLUCINOGENS

The known hallucinogenic substances may be considered under four main headings: (1) the indole alkaloids, (2) the phenethylamines (sympathetic nervous system stimulants), (3) the piperidine derivatives, and (4) the tetrahydrocannabinols (the psychoactive ingredients of marihuana and other drugs prepared from the hemp plant).

THE INDOLE ALKALOIDS

These consist of (a) tryptamine derivatives such as the short-acting drugs DMT and DET, (b) other tryptamine derivatives which are present in certain mushrooms such as the psilocybin mushroom, (c) harmine (the source of some intoxicating drinks in South America), (d) lysergic acid (the ergot derivative which is the basis of LSD), and (e) the iboga alkaloids (the plant-derived substances used in Africa to increase endurance).

DMT and DET

Tryptamine itself has no hallucinogenic properties, but a number of variants of the tryptamine molecule are extremely potent in this respect. *Dimethyl*tryptamine, or DMT, was mentioned earlier as the hallucinogenic agent in a number of South American intoxicants. It occurs naturally in the seeds of the shrub *Piptadenia peregrina* and from these seeds the snuff known as cohoba is made. DMT is also produced synthetically. Within five minutes of sniffing or smoking this drug, the user experiences visual hallucinations, marked distortion of perception, and euphoria, all of which will usually disappear within about an hour. *Diethyl*tryptamine, or DET, has similar effects, but these generally last two to three hours. By now a large number of drugs in this general category (the dialkyltryptamines) are known and have been used.

Other Tryptamine Derivatives

Bufotenine, like DMT, is contained in the seeds of the shrub *Piptidenia peregrina.* Bufotenine is also found in the glandular secretions of certain toads of the genus *Bufo* and in the northern mushroom, *Amanita muscaria,* the fly agaric. Psilocybin, a substance which is to some extent similar in chemical composition and which was known by the Aztecs as teonanacatl, is derived from Mexican mushrooms of the genus *Psilocybe*. Both bufotenine and psilocybin produce effects in man quite similar to those of LSD.

Harmine

This substance occurs in the shrub *Peganum harmala* and in a number of plants including the South American liana, *Banisteriopsis caapi*. The intoxicating drink ayahuasca is prepared from the bark of this plant.

Lysergic Acid

Although the Swiss chemists Stoll and Hofmann synthesized LSD in 1938, it was not until 1943, as we have seen, that Hofmann accidentally discovered the psychoactive properties of this drug. On that occasion he was seized with dizziness and restlessness, and his visual perception of the various objects and people in his laboratory underwent curious changes. He felt strangely inebriated, and with his eyes closed he saw fantastic images of extraordinary plasticity.

It is not quite correct to say that the psychedelic age began with Hofmann's experience because a number of hallucinogens ranging in potency from *Cannabis* to mescaline had been known for centuries and experimented with for at least sixty years. Nevertheless, Hofmann's discovery was epochal because in the following years LSD became the preferred drug among an increasing population of non-scientific experimenters.

LSD is probably the most potent psychotomimetic agent yet discovered. Doses of as little as 20 micrograms are capable of producing marked alterations of consciousness in man. Euphoria commonly occurs, and other changes in mood ranging from anxiety to terror, delight to awe, distaste to loathing, distress to horror, may also take place. Changes in perception can occur in all the senses. Thus vision, touch, hearing, taste, and smell may all be affected. Visual hallucinations are especially common. The body image may be distorted, perception of time and space may be altered, and there may be a frightening or fascinating sense of unreality. The mystical feeling of transcendence experienced by many users is derived from combinations of these novel experiences.

There are also, of course, marked effects on the autonomic nervous system, especially the sympathetic division. The result is dilatation of the pupils, a rise in body temperature, rapid heartbeat, and increased alertness proceeding to the point of confusion.

Marked tolerance develops after a dose of LSD. In succeeding days the dose must be increased substantially if further mental changes are to be produced. Moreover, there is a cross-tolerance to mescaline and psilocybin and to other lysergic acid derivatives.

The effect of the drug may be counteracted with a phenothiazine tranquillizer, but the intravenous use of diazepines has recently been increasingly favored for this purpose. Reserpine strikingly potentiates the action of LSD.

The seeds of the Mexican morning glory, *Rivea corymbosa* yield ololiuqui, an ancient Aztec drug. This material contains lysergic acid amide, a chemical that is closely related to the synthetic LSD. However, it is much less potent pharmacologically, and the seeds themselves contain a number of other alkaloids some of which cause unpleasant side effects such as nausea and vomiting. Morning glory seeds accordingly have never achieved much popularity among experimenters.

Iboga Alkaloids

The African shrub *Tabernanthe iboga* contains the hallucinogen ibogaine. Apparently this root is used in parts of Africa to improve endurance. Hunters who eat ibogaine can remain quite still for many hours while awaiting the arrival of their prey. Yohimbine is another alkaloid that has an hallucinogenic effect. Another is mitragynine, a chemical derived from the plant, *Mitragyna speciosa.* This plant is used as an intoxicant by certain tribes in Borneo.

MESCALINE AND ADRENALINE

Mescaline

This alkaloid occurs in the dried head of the cactus, *Lophophora williamsii.* It has a particular place in the history of psychiatry because it was the first undoubted hallucinogen to be used for the purpose of creating a drug-induced model psychosis. Knaven, a student of the great classifier of mental diseases, Kraepelin, used the drug in this way during the last decade of the nineteenth century. Earlier such celebrated figures as Havelock Ellis and Weir Mitchell had personally eaten the cactus and reported their experiences. However, the active principle was not isolated until 1896.

The cactus itself contains only 6 per cent mescaline (3,4,5 trimethoxyphenethylamine). More recently this alkaloid has been found in a number of other plants including other *Lophophora* species, the Argentine giant cactus, and the Peruvian cactus.

Mescaline is not as potent an hallucinogen as LSD, but at higher doses (up to 0.6 grams) striking effects occur, the most important of which are perception of visual hallucinations in color, depersonalization, and distortion of time sense. However, the user's intellectual abilities tend to remain intact. A number of effects suggesting stimulation of the sympathetic nervous system interfere with the otherwise pleasant, dreamy state of the cactus eater.

The effect of a single dose of mescaline persists up to 12 hours. There is no indication that physical dependence occurs and there are no abstinence symptoms. It is clear, however, that psychic habituation to the pleasurable effects of mescaline does occur. Although this drug has been used in the study of schizophrenia and also in the study of visual hallucinations, there does not appear to be any persisting inclination to use the drug in the treatment of mental illness.

Adrenaline

Adrenaline and noradrenaline are, as we have seen, necessary for the transmission of nerve impulses within the sympathetic nervous system. It has long been known that in a condition of fear adrenaline is released into the blood stream, preparing the frightened animal either for fight or flight. Large doses of adrenaline, however, can by themselves actually produce the sensation of fear and tension. High doses of such adrenaline-like drugs as the amphetamines will produce mental alertness, euphoria and (later) confusion, disorientation, and hallucinations. Repeated overdoses of amphetamines can produce a clinical picture remarkably similar to that of paranoid schizophrenia.

PIPERIDINE DERIVATIVES

Piperidyl Glycolate

The belladonna alkaloids atropine and scopolamine contain piperidine. (Interestingly, so does cocaine.) All of these substances have been known for centuries to have marked psychoactive effects. Continued administration of large doses of these chemicals will produce hallucinations, alterations in mood, and other symptoms suggestive of schizophrenia.

In the last ten years a number of compounds have been produced that have been based on the piperidine ring of atropine. Some of these have greatly increased the hallucinogenic properties of atropine. Ditran is one of these. With further modification of the molecule, benactyzine can be produced. This drug was designed to serve as a tranquillizer, but hallucinations have been reported as a side effect.

TETRAHYDROCANNABINOLS (MARIHUANA)

In a review of the *Cannabis* literature, Oriana Kalant of the Addiction Foundation in Toronto reported in 1968 that there had been only 2,000 publications on this subject. (57) Considering the antiquity of the use of this drug and its undoubted acculturation in many parts of the world, this seems small indeed. (The literature on the amphetamines, drugs that were introduced in the 1920's, already comprises 2,000 items.) There are several reasons for the relative neglect of this important drug. First, the published material is almost entirely written in the major European languages. Half of the studies are in English. Yet widespread use of *Cannabis* has been confined to Asia, Africa, and South America, regions of the world in which the scientific impulse has been generally lacking, and it is not surprising that Western science failed to interest itself in a drug that had no established therapeutic applications and which was not used by Westerners either in the practice of religion or in recreation. Another important cause of the failure of this drug to excite the interest of Western scientists was the fact that until 1942 only the unstable crude extract was available. Because the potency of this preparation could not be assured, valid statements concerning the pharmacologic effects of *Cannabis* could not be made.

Two crucial developments have taken place within the last thirty years that have markedly altered this situation. First, the tetrahydrocannabinols (THC) have been prepared and identified as pure compounds. The administration of these preparations reproduces the effects of ingesting crude hemp products but, most importantly, the dose can be controlled. We can expect therefore that in the next few years much work will be done in this area.

The second fundamental change affecting *Cannabis* as a subject for research has been the extraordinary spread of the use of this drug in Western society. Although Europeans encountered Indian hemp as long ago as the eleventh century, the psychotropic properties of the drug did not come to be widely appreciated in the West until the 1920's. Since that time, the diffusion of marihuana has been inexorable, and by the early 1940's the use of marihuana was considered to be an important subject for scientific research. It is significant that half of the publications on this subject have appeared in the last 25 years.

The effects of marihuana on man include euphoria, the freer flow of ideas and images, perceptual distortion, and disorientation in time and space. The physical effects include unsteady gait, dizziness, ringing in the ears, and tremor. The actual experience of the subject depends very much on his expectations, the degree of security of the setting, the potency of the material available, the dose, and the presence of other chemicals as contaminants. However, perhaps one of the most important variants is the personality of the user. Some people are particularly resistant to any loss of conscious control, while others desire this effect and eagerly welcome its appearance. Mentally unstable people are especially vulnerable to habituation and to the intensification of their pre-existing symptoms. People with relatively normal personalities are also vulnerable to the physiological effects of the drug and therefore can experience pleasurable intensification of all sensory perception, novel mental imagery, and a degree of euphoria. However, such people are much less inclined to become habituated to the use of marihuana.

The resinous exudate of the flowering tops of the female hemp plant contains the highest concentration of the active alkaloid. Some THC may also be found in the leaves of the plant. The resin is called charas in India and hashish in the Middle East. In India, the dried leaves and flowers are commonly contained in a concoction called bhang. This preparation is roughly comparable in potency to the marihuana commonly available in North America. Of intermediate potency is ganja, a preparation composed of the resinous mass from the small leaves and flowers.

Some of the synthetic derivatives of the tetrahydrocannabinols in hemp are known to be much more potent than any of the natural plant products.

MEDICAL USES OF THE HALLUCINOGENS

Drugs classified in the four great groups noted above differ widely in the extent to which they have been accepted in medicine. Such piperidine derivatives as atropine and scopolamine are, of course, basic medical instruments. Such stimulants as adrenaline and the amphetamines are also essential medical drugs. It is largely with regard to the first group, the indole alkaloids, and the last, the cannabinols, that there is controversy concerning medical usefulness.

In 1889 Landry suggested that the extract of peyotl had the power to stimulate, sedate, and strengthen all at the same time. A few years later, observers who had noted its visual effects advised that this drug might be useful in cases of color blindness. However, the further history of peyotl was to be religious and recreational, not medical. In fact, it was not until the synthesis of lysergide that interest in the psycholytic capacity of the indole alkaloids was revived. Thus in the 1950's attempts were made to replace Pentothal sodium and methamphetamine with LSD to facilitate psychiatric abreaction (recall of experiences for a therapeutic purpose). The drug was used in treatment in two fairly distinct ways. It might be given in small doses on a number of occasions when it was felt that the patient's trend was blocked, or it might be given in one massive dose in the hope that the overwhelming experience consequent upon this would be reorganizing and productive of new insights. Several rhapsodic accounts were written regarding these therapies but experimental design was notably absent from all of them.

In the years that followed, many disorders were treated with LSD, including infantile autism, adult psychopathy, alcoholism, drug addiction, and obsessive-compulsive states. However, in the late 1960's well designed double-blind studies such as that carried out by Smart and others at the Addiction Research Foundation in Toronto began to appear. (58) (59) These studies failed to confirm the impression that LSD might be a valuable adjunct to pre-existing forms of treatment.

Although more work must be done in this intriguing area, it can be said at the moment that the early idea that LSD would become a valuable therapeutic agent has not been confirmed. Indeed, the most convincing studies have clearly denied it. Although it is true that in controlled clinical settings in which pure LSD is used on patients who have been carefully selected for the treatment the incidence of untoward side reactions is low, the benefits still do not outweigh the risks involved.

A number of studies have suggested that LSD may have an injurious effect on human chromosomes, and much more research must be done in this area; also, the question of the value of LSD in treatment must be explored in much more detail. For example, there has been a suggestion that LSD may be of value in cases of terminal cancer. The drug not only has powerful analgesic properties but confers euphoria and detachment; and these states of mind, in people certain to die soon in great pain, may at least in some cases be desirable.

The issue of the medical usefulness of the indole alkaloids has been greatly confused by the intense social and legal controversy now surrounding them. For this debate to be rationally conducted nothing would be more important than that it be informed by objective clinical studies. Regrettably, this crucial source of information has been limited by the existence of the very problem to which it might have brought some clarification.

Marihuana was at one time tentatively accepted by Western medicine as a drug that might be useful in the treatment of mild anxiety and depression. In the huge volume *The Origin of Life* by Dr. F. Hollick, published in Philadelphia in 1878, *Cannabis indica* is considered with the aromatics and spices. Dr. Hollick reports that "there is one drug, brought from the East Indies, the *Cannabis indica*, which is the most regular in its action, and produces the most constant beneficial effects of anything yet tried. It appears to act as a special nervous stimulant, exciting those parts of the brain which influence the sexual organs, so that they feel directly an increase of power. It also causes great mental activity, disposes to cheerfulness, and induces a feeling of warmth and comfort over the whole system. Those who have taken it, in a proper manner, are delighted with its effects, and never complain of any afterdepression or reaction in any way. If given improperly, however, or in too heavy a dose, it first causes excitement of the wildest character, with an uncontrollable disposition to bodily activity, and afterward a complete mental and physical prostration. In short, it is most powerful, either for good or for ill, according as it is used, and is the only means we possess, in numerous cases, of restoring sexual power and desire. In the East Indies it is commonly used, like opium in China, for the purpose of producing pleasurable excitement, and also for removing impotence."

It is interesting to note that this apparently very liberal doctor devoted immense sections of his book to the proposition that masturbation, or what he called the solitary vice, was responsible for the need for hospitalization in the case of virtually every mentally ill person in the United States. In such mysterious ways do our moral fashions change.

Today marihuana is not used in Western medicine. It has some antibacterial activity, but other drugs are more efficient in this sense. Though numerous papers have been written proposing its use as a tranquillizer in a wide variety of clinical states, it is unlikely that the drug will be applied in this area.

Considering the explosive activity of our chemists at the present time it is probably safe to predict that if marihuana is ever honorably readmitted to the medical armamentarium it will find itself utterly outclassed by the precursors of panaceazine that will, by then, be found there. The future of marihuana will be recreational and, perhaps, political.

Part 3

ENDURANCE

17.

The Use of Drugs in War and Sport

Man has a peculiar tendency to get himself into situations that test his endurance to its very limits. Sometimes his aspirations exceed his capacity to withstand the stresses that he subjects himself to, and he simply fails to survive. Man more viciously and relentlessly challenges himself than any other animal in the world, the noble ant notwithstanding. And man is annoyed by his frailty. He therefore applies his celebrated ingenuity to the problem and he invents methods of eking out final bits of strength so that he can carry on, succeed, and conquer. He must endure even when the odds are hopelessly against him, and he must prevail.

There are two interestingly similar circumstances in which the simple need to excel physically is obvious.

One of these is in the pursuit of athletic honors and the other is in the conduct of war.

DRUGS IN WAR

The Amerindians used peyotl to allay fatigue in the accomplishment of such strenuous tasks as hunting and making war. Cocaine was an important energizer for the forces of the Incas. Hashish has been frequently referred to as a drug that improved the performance of certain militant groups in the Middle East. In fact, every ancient drug in this book has had some military application, especially if we include the appeal to the gods as a crucial first act of war.

In the conduct of the wars of our time the stimulants have been particularly important. Following reports in 1942 that German tank crews were using central nervous system stimulants, investigations were carried out by the Allies to determine the risks and advantages of issuing amphetamines to soldiers in the field. In one early study by Somerville, two groups of 50 soldiers marched for 17 hours. One hour before the end of the march one group was given 15 mgs of amphetamine sulphate (Benzedrine); the other received a placebo. At the end of the march performances on an obstacle course and in marksmanship were compared. No significant difference in performance could be detected. It was concluded that Benzedrine appeared to have no power to avert deterioration in military efficiency. (60)

On the other hand, the conclusion of a study by Seashore and Ivey (61) was that stimulants were definitely superior to a placebo in their effect on both subjective symptoms and motor performances among soldiers operating under varied military conditions. In still another study, RAF bomber crews on prolonged missions suffered far less fatigue after taking amphetamines than without the use of these drugs. (62)

There is no doubt that all the warring forces made use of stimulants in an effort to sustain aviators and maintain working capacity among soldiers engaged in extended campaigns. With respect strictly to the moderate use of stimulants by soldiers afflicted with fatigue or boredom, the consensus seems to be that these drugs do improve the capacity of men to endure and that military efficiency is therefore enhanced. The hazard, of course, is that physical activity that continues after the bodily signals of fatigue have been duly received further diminishes a person's reserve of strength. Natural variations in human strength are obliterated in this way, but clearly some of the individuals artificially inspirited will soon be operating perilously close to physical depletion. Their condition will not be apparent until they collapse.

DRUGS IN SPORTS

In our society the easy use of many drugs is encouraged and imperfectly controlled. Athletes and coaches live in that same society and show the cultural attitudes that commonly prevail in it. Accordingly, athletes have participated in the general trend toward increasing reliance on drugs in the performance of their work.

Three groups of drugs may be considered in this regard. The restorative drugs are used primarily to treat medical or psychological conditions so that the athlete may be able to compete unhindered by bruises or anxiety. Thus, athletes may be inclined to use the tranquillizers, the sedatives, and the muscle relaxants as uncritically as anyone in the general population. Similarly the use of such local anesthetics as Novocaine and ethyl chloride and any of the systemic pain killers seems unexceptionable. By logical extension, it is quite easy to conclude that such anti-inflammants as Butazolidin and cortisone should reasonably be used. And having accepted these drugs, it is not very difficult to accept the use of what have been called the anabolic steroids. Gradually there has been an insidious progression toward practices that challenge the basic ethics of sports.

The anabolic steroids are hormones that are derived from various plant and animal sources. Androgen, the male hormone, is an anabolic steroid. Now when an athlete, male or female, takes such a drug as Dianabol, Durabolin, or Nilevar there will follow an accentuation of male secondary sexual characteristics. Thus the voice will deepen, the beard will grow, and the muscles will develop in a typically masculine fashion. The assimilation of protein is facilitated and thus there is increased muscle mass and body weight. Because muscle mass does not necessarily correlate with strength, it is by no means established that these anabolic steroids actually improve performance. Nevertheless, a great many athletes have apparently concluded that the mere possibility of such improvement justifies the risk and inconvenience of taking these drugs.

The body building drugs occupy an intermediate point between Aspirin and Miltown on the one hand

and the stimulant drugs on the other. With all three groups, of course, the goal is the production of a more efficient competitive instrument. The athlete may be restored to good health with the analgesics and no one will complain. It is medical and therefore sanctioned by society. He may be given greater power through the use of the male hormones, and again no one will complain. It is a rational application of modern technology and every athlete, presumably, longs to be a supermale. He may be exhilarated and given greater endurance by the stimulants and again, it would seem, hardly anyone complains.

Since this process, if projected into the future, will finally be very injurious to sports, a re-examination of the matter is very much in order. Questions which must be answered include whether the drugs do improve performance, whether such improvement justifies the risk, and whether the creation of drug-assisted athletes enhances the value and prestige of sports.

Of the many studies designed to measure the effect of the amphetamines on physical performance, the most convincing have been carried out in the area of sports. Too many variables may affect the performance of an assortment of soldiers marching on broken terrain for 17 hours; a hundred yard free style swim by trained athletes is, by comparison, elegant and simple. Accordingly a number of excellent studies have been carried out using a variety of track and field and water sports. The results almost invariably indicated measurable improvement in performance among athletes using the stimulants.

Smith and Beecher (63) carried out a series of studies on the effects of drugs on athletic performance.

In one of these studies they observed 15 college swimmers, in mid-season condition, swim 360 time trials after receiving 100 mgs of secobarbital, 14 mgs of amphetamine, or a placebo. After each trial the swimmer estimated his time and the quality of his performance. The barbiturate significantly impaired performance and caused the swimmer to judge his performance as excellent when in fact it was unusually bad. The amphetamine significantly improved performance, and no effect on judgment was conclusively shown. The difference between the amphetamine and the placebo in terms of performance was small, a mean of 1.16 per cent, but it must be noted that athletes commonly train for months to gain just such small improvements.

In studies on motor co-ordination and control, caffeine had little effect on reaction time but the amphetamines definitely lowered it, especially in fatigued subjects. (64) Caffeine impaired hand steadiness, whereas amphetamines improved it. Caffeine had no effect on co-ordination, but amphetamine brought about improvement in this area as well. In fact, in every test from running the mile to passively monitoring a screen, amphetamine improved performance over the placebo, caffeine had little effect, and the barbiturates and alcohol diminished the quality of the performance. It cannot be held that such improvement is caused by the mere inducement of lighter spirits and therefore more favorable attitudes toward the work. It is much more likely that the stimulants caused both attitude changes and performance changes and that these factors are at least initially independent of one another. Nor can it even be said that only performances degraded by fatigue can be improved by the stimulants.

Athletes in conditions of rest, on being given amphetamines, exceed the best efforts that they can make on other occasions on placebos. Moreover athletes engaged in such tests of static strength as weight lifting and operating grip-measuring dynamometers also show definite improvement in performance. (65)

Of course there are at least a few studies that fail to observe any change in athletic performance. Karpovich, for example, gave 20 mgs of amphetamine to 54 male athletes either one-half hour or one hour before a test. He found no significant improvement in operating treadmills to exhaustion or in track events or swimming. (66) It may be of some importance that this investigator ran his tests well before the known peak effects of the drug might be expected. Moreover he used decidedly lower doses than were used in the other studies. (67) (68)

The consensus, then, is that the sedatives diminish performance and that the stimulants — especially the amphetamines — improve it. The improvement, it is true, is very slight; but it is significant all the same, and today the tense and serious state of athletics is such that any slight advantage is highly valued.

It is interesting that horse racing has acquired the reputation of a sport characterized by illegal doping. The reason for this is curious. In the United States horse racing is the only professional sport in which there are written regulations controlling the use of drugs. Dancer's Image was involved in a great scandal after winning the Kentucky Derby in 1968 because Butazolidin was found in a urine sample. No men playing football, basketball, hockey, or baseball were similarly examined in the same year. Surely these sports could not be charged with such outrageous illegalities as had occurred in Louisville. Yet Butazolidin was widely used by men playing all of these sports in 1968. The National and American Baseball Leagues have no rules regarding the use of drugs. The professional football leagues, the American Basketball Association, and the National Hockey League also have no written rules relating to the use of drugs.

Is is of further interest that international bicycle racing has achieved an especially bad reputation for drug use. The European cyclists, it would seem, rely heavily on the use of the stimulants. Again, the real reason why cycling has this reputation is because it is one of the few sports that specifically bans the use of drugs. The International Olympics Committee, of course, has made every effort to control the use of drugs. The Committee specifically bans amphetamines, cocaine, the opiates, hashish, the more potent analgesics, and the excessive use of alcohol.

From time to time amateur sports organizations in Canada and in the United States express some concern about the use of drugs among young athletes. They publicly deplore the state of affairs that obtains in professional athletics and threaten to discipline any of their own coaches and athletes who are found to be using, supplying, or even advocating the use of drugs. Yet these very governing bodies are, to at least some extent, responsible for the problem. The spirit of competition is no doubt crucial in sports, but today this spirit has become intense and the element of enjoyment has been diminished in the process. The athlete who establishes a record or wins a race is honored out of all proportion to the significance of his achievement, and in this way the means has come to be justified by the end.

In war, sports, all night studying, and long distance truck driving, it would seem, any aid to endurance or excellence in performance is readily accepted. The apparently remote consequences of drug use seem to be outweighed in importance by the immediate and entirely measurable advantages.

Part 4

EXTINCTION

18.

Suicide and Murder

The suicidal gesture involves the telling of an intention, the writing of a note, or the commission of a life-threatening act. The intention is not actually to die; it is to make a graphic plea for help. A suicidal gesture is, as a rule, very disturbing to everyone involved, and as a result the social world of the troubled person is at least temporarily reorganized. Because it is not changed sufficiently or permanently, many cases have been described in which recurrent suicidal gestures have been made.

On the other hand, suicidal attempts that succeed are usually those in which the person actually desires to die.

It is apparently not difficult to achieve death if the motivation to do so is strong and persistent. In any case, suicidal gestures seem to occur about eight times as frequently as do suicidal attempts that end in death. (69) (70) Moreover, it is apparent that the more urgent the desire to die the more certain and violent will be the method used. The use of firearms, accordingly, remains the most frequent method of self-destruction in cases of successful suicide; considerably fewer people hang themselves. However, in a society that seems to be increasingly dependent on drugs for a variety of reasons, the prevailing awareness of drugs and their effects must certainly be reflected in patterns of suicide. This can easily be shown statistically.

In 1950 only 5 per cent of all suicides in the United States were attributed to drugs. By 1964 the figure had risen to 12 per cent. By 1968 about one third of the successful suicides involved the use of prescription drugs. Indeed, the figure may be higher still because the conduct of inquests is by no means uniformly competent. Many cases of chemical suicide must go unreported as such, with other causes, especially circulatory ones, being frequently listed instead. Moreover, the intentional use of various drugs is probably involved in some single car accidents which may actually be suicides though not suspected to be such.

BARBITURATE OVERDOSE

Among the people who take lethal overdoses of drugs, by far the greatest number use barbiturates. Moreover, the steadily increasing incidence of suicide from overdosage is largely attributable to this group of drugs in spite of the fact that other very potent drugs are widely available today and even though the fashion for barbiturate sedation has clearly begun to fade. The general public still recognizes that the barbiturates are more reliably lethal in small doses than are any of the other commonly available drugs.

The extraordinary decline and incline respectively of utility gas and barbiturates illustrates most graphically the changing fashion in drug-induced suicide. In 1950 the use of gas was greater than the use of the barbiturates by a factor of four. From that date the incidence of gas use curved steadily downward and the use of the barbiturates curved steadily upward. In 1957 they crossed, and by 1963 their original positions were exactly reversed. The barbiturates have continued to rise and utility gas has nearly disappeared from the graph. (71)

Among the barbiturates it is the short-acting ones that are most commonly used. Thus, secobarbital is most often used and this is followed by pentobarbital, amobarbital, and phenobarbital, the slowest-acting of them all. (72) It is interesting to note, however, that from 1955 to 1964 the discovery at post mortem of phenothiazine tranquillizers in cases of death in which no other cause could be determined occurred with increasing frequency. As might be expected, chloral hydrate and paraldehyde are still occasionally found, but the newer sedative-hypnotics are appearing with increasing frequency. Such preparations as glutethimide (Doriden) and ethchlorvynol (Placidyl) are now beginning to challenge the barbiturates as suicide drugs of choice. (73) Meprobamate or Miltown is manufactured and sold in tonnages about equal to that in which the barbiturates are made and sold, yet meprobamate has not become a suicide drug of major proportion. No doubt the barbiturates are implicated in suicide more than three times as often as the tranquillizers because of the much greater margin of safety among these other drugs. With the barbiturates the ingestion of from five to 15 times the hypnotic dose may be fatal. With meprobamate the ingestion of over 50 therapeutic doses at one time may not be fatal. (74)

USE OF OTHER DRUGS IN SUICIDE

Probably all of the potent drugs referred to in the medical section of this book have been used alone or in combination with other drugs for the purpose of suicide. Some of these have wide margins of safety. The major tranquillizers, for example, will generally not be lethal in less than immense doses. Largactil, it has been calculated, may be non-lethal under 1,000 mgs. The maximum non-lethal dose of Mellaril is said to be 2,500 mgs. The maximum non-fatal dose of Librium is said to be 1,000 mgs, for Valium 700 mgs, and for meprobamate 8,000 mgs; however, many clinicians have seen cases in which doses greatly in excess of these amounts have not resulted in death. Meprobamate, for example, has failed to cause death in a dose of 38,000 mgs.

The antidepressants have also been used for the purpose of suicide. Elavil and Pertofrane may be lethal after 1,000 mgs, Tofranil after 1,200 mgs, Nardil after 525 mgs, and Parnate after 250 mgs. Again, there have been cases in which all of these drugs have been ingested in still higher doses without producing death.

The opiates and the hallucinogens have been used for suicide, but in such cases it is especially difficult to determine the real intention of the person who dies as a result. Very often the user has no real knowledge of the actual potency of the pill he has swallowed or the fluid he has injected. With all such drugs it is very difficult to distinguish between accident and hard resolve.

SUICIDE AMONG THE YOUNG

Another trend in recent years is also very much worth noting. Almost 20 per cent of the people who attempt suicide are under 20 years of age. The number of adolescents who attempt and successfully carry out suicide is increasing. Moreover, as might be expected in a segment of the population that is especially oriented toward drugs, about 87 per cent of such cases involve the use of drugs. In comparison with the incidence of the use of drugs for suicide in the general population, this is a very striking figure. (75)

TREATMENT OF OVERDOSE

Treatment of a patient who has attempted suicide with drugs can be very difficult, because the person who genuinely intends to kill himself will carefully guard against detection and will exceed the lethal dose by a considerable margin. Such people, if they are not already dead, will be in very serious condition when they are found. The determined suicide will frequently drink alcohol before he swallows his pills and, not uncommonly, he will take an assortment of whatever chemicals happen to be on hand. Thus the effects of Doriden, Miltown, Librium, or perhaps a major tranquillizer will be added to those of a barbiturate in achieving the desired depression of the nervous system.

When he is found, the patient who has taken a barbiturate overdose may be comatose if more than half an hour has passed. His pupils will be constricted (although in the later stages of barbiturate poisoning there may be paralytic dilatation). There is marked respiratory depression and the blood pressure is low. The pulse is weak and rapid, and the skin is cold and sweaty. If death occurs, it will be due to respiratory paralysis.

A contributing factor of the greatest importance is the depression of the vasomotor centre in the brain. This results in shock characterized by hypotension (lowered blood pressure), peripheral cyanosis (bluish discoloration of the extremities), and possibly anuria (retention of urine). (76) Although stimulant drugs have long been used in the treatment of coma in the severely intoxicated patient, the crucial importance of maintaining the blood pressure must now be recognized. Today the intravenous infusion of very large volumes of physiologic fluids for that purpose is considered essential in the treatment of such cases.

THE QUESTION OF AUTOMATISM

It has been suggested that automatism accounts for many deaths from barbiturate overdosage. According to this theory, a person takes a capsule not intending to die but intending to get to sleep. However, the drug creates a confusional state and while in this condition the individual takes another capsule. This process continues until a lethal overdose has been ingested. This theory, a speculation based on three cases, was accepted in the 'thirties by most medical authorities and it has been uncritically handed down from paper to paper.

On closer inspection, it is reasonable to question this theory. (77) If a huge concentration of barbiturate is found in the tissues at post mortem and if there is other evidence of the drug such as incompletely digested capsules in the stomach, it must be assumed that the deceased took a large amount of the drug over a very brief period of time with the intention of committing suicide. He would be aware, during this short period, of the meaning of his actions.

There seems to be no evidence that automatism occurs, and the theory remains to this day entirely speculative and unproven. Although it has been used in courts of law to establish that death was accidental, this argument cannot any longer be given any credence. If a person takes an overdose of barbiturates he intends either to die or to indicate to certain significant people that his environment must change. If his intention is the latter and he dies, it is accidental, but this accident is not due to automatism.

HOMICIDE WITH DRUGS

The use of drugs for homicide has an ancient and romantic history. In 1384, Charles the Bad of Navarre commissioned a minstrel to kill Charles VI of France and a few other august people. Charles told the minstrel, "There is a substance called arsenic sublimate. If one eats as much of it as a pea he will never live. You will find it at Pamplona, Bordeaux, Bayonne, in all the good towns that you pass through at the apothecaries. Get some and powder it. Station yourself near the kitchen, side-board or some other convenient place and put some of this powder in their food or drink."

This plot failed, but for centuries arsenic continued to be the most famous poison in Europe. By the seventeenth century arsenic was frequently used to resolve diplomatic and domestic conflicts. Indeed, in France it came to be known as *poudre de succession* (inheritance powder). In the time of Louis XIV the wealthy employed food tasters, usually wretched servants. Cardinal Richelieu, however, tried to outwit his treacherous enemies by testing his dinners on his collection of cats.

Strychnine, antimony, belladonna, and hemlock are probably the most ancient poisons.

Arsenic was valued for its alleged medical properties by the ancient Greeks. By the time of Caligula, the Romans had come to believe that gold could be made from arsenic. This belief reached its peak in the seventeenth century in England and France when alchemists spent much of their time working on this problem. In the meantime common people continued to use arsenic without restriction to kill rats and insects. Perhaps they also managed to kill one another occasionally with this chemical, but there is no way of knowing how often this drug was used for homicide. Probably more direct methods of murder were more commonly employed. With the invention of the syringe in the nineteenth century, however, the ability of a number of drugs to cause instant death was greatly increased. Oral ingestion, even of arsenic, commonly results only in vomiting and therefore recovery, the final Act of Hamlet notwithstanding.

It seems likely that some of the deaths reported today as suicides are in fact due to the efforts of some person other than the deceased. It appears that the opiates and perhaps insulin are used in this way because overdoses can be administered in very small quantities and rapidly. A number of commercial products may also be used. Certain insecticides, for example, contain powerful drugs capable of causing death with certainty and speed.

Modern crime laboratories are very efficient and accurate in determining cause of death and the amounts of poisonous substances in the blood, urine, tissues, and stomach contents of the deceased. The motive of the human administrator of the poison cannot always be clarified with this degree of certainty. The distinction that must be made between murder, suicide, and accidental ingestion continues to be difficult at times. In a progressively more drug - minded society such as ours we will probably see an increasing reliance on the use of chemicals in homicide, and the chemicals used will probably be those that have particular effects on the functioning of the central nervous system. The technology of killing has reached an advanced stage, as will be noted in the next chapter. It seems unlikely that the extraordinarily potent brain poisons that have been developed for war will remain forever unavailable to the general population.

THE AFRICAN ORDEAL

In certain parts of Africa quite another use of drugs has occurred that simply cannot be classified according to the scheme adopted for this book. I refer now to the practice of the ordeal. In this it is first recognized by the people that necromancers and sorcerers exist among them. It is determined to discover exactly who in the population has been possessed by these devils. Accordingly the entire village assembles on a certain day in some clearing or other suitable place, and everyone swallows a measured amount of the dreaded poison. Those who subsequently vomit survive and those who die are identified as the sorcerers. The remaining group returns jubilantly to the village singing, dancing, and rejoicing. There is general relief because of personal survival and a sense of freedom from the sorcerers.

The calabar bean was once very commonly used in parts of West Africa for this purpose. This bean contains the cholinergic chemical physostigmine. In other places a variety of plants containing such chemicals as atropine and scopolamine have been used to weed out the malefactors from among a population plagued with ill-fortune. Various plants occur in Africa that contain strychnine as well. Survival following the ingestion of these chemicals would indeed be something of an ordeal.

19.

Chemical Warfare

Man has used incapacitating and lethal chemicals in warfare for thousands of years. In about 2000 B.C., for example, it is reported that some Carthaginian soldiers one day suddenly deserted their camp, leaving behind a great deal of wine which had been treated with mandragora. The enemy advanced triumphantly, celebrated their easy victory, and promptly fell asleep. The Carthaginians stealthily returned and dispatched the celebrants, but presumably resisted the temptation to make merry with whatever remained of the denatured wine. It is also well known that a number of South American tribes treated their arrows with curare, a chemical that affects neuromuscular conduction in such a way as to paralyze the muscles supplied by the cranial nerves, the muscles of the trunk and extremities, and finally the respiratory muscles. However, the use of chemicals as elements of tactical warfare did not receive anything more than sporadic attention until the nineteenth century.

In reflecting on technological developments during the past century and a half, it is difficult to escape the realization that in virtually every aspect of applied science there were hesitant attempts at development in the early or middle part of the nineteenth century which were clearly precursors of the sophisticated approaches to perfection that are characteristic of the twentieth century in mid-career. Paralleling the advances in many other fields, the development of modern techniques in chemical warfare began with a few uneasy steps in the nineteenth century and continues today in a headlong gallop. It is also remarkable that this entire process has been guided by principles precisely opposite to those of medicine, another branch of technology reaching sophistication during the same period. Hygiene tells us that it is advantageous to keep our wells pure; the technology of war tells us at the same time that the wells of our enemies can be poisoned with potassium cyanide. While medicine was studying smallpox and blocking this dread disease through vaccination, wagers of war were distributing contaminated blankets to the American Indians in order to spread the disease. Chlorine was proved to be useful for killing bacteria in water; it was also used to kill men in the trenches at Ypres. Mustard gas also caused many injuries in World War I, and between the Wars the development of poisonous chemicals reached a new peak in the nerve gases. These have never been used, fortunately, but it is because of their existence that a chapter on chemical warfare has a place in a book on drugs that affect the nervous system.

A NEW CLASS OF CHEMICALS

It was while studying a group of organic phosphorus chemicals in the laboratories of I. G. Farben Industrie in 1936 that a German scientist came upon an entirely new class of chemicals. Over the next 12 years there emerged from Germany three nerve gases known as Tabun, Sarin, and Soman. A fourth, known as DFP (di-isopropylfluorophosphate) was developed by the British in 1941. Between earlier weapons like chlorine gas, phosgene gas, and hydrocyanic acid and these later chemicals there is a gap as great as that between the howitzer and the ICBM.

The effect of the nerve gases is a result of their ability to interfere with the fundamental nervous system process in which electrical impulses pass from nerve endings to mucle fibres. In this process the drug acetylcholine is released; once the impulse has passed into the muscle, an enzyme known as cholinesterase immediately breaks down the acetylcholine and the connection is broken. The nerve gases act to inhibit the action of cholinesterase. The result, of course, is the abnormal persistence of acetylcholine. No chemical change occurs to stop muscular contraction and as a result generalized muscular contraction continues to the point of helpless inco-ordination and, ultimately, death. The symptoms are those of overstimulation of the parasympathetic nervous system. It is as though an enormous dose of acetylcholine had been injected into the victim and all of the somatic and central effects described in the section on the autonomic nervous system were rapidly apparent. Death, when it comes, is due to asphyxiation caused by paralysis of the respiratory system through fibrillation (small, rapid, and uncontrolled contractions of muscle fibres).

POST-WAR DEVELOPMENTS

During World War II the Germans were engaged in the large-scale production of Tabun and were prepared at any time to begin production of Sarin. After the War, the Russians removed an entire plant to the Soviet Union, and the British and Americans began in earnest their own researches into chemical warfare. This work has been extraordinarily secretive because the popular belief persists that to use gas in war is to commit the supreme act of barbarism. War is barbaric in any form; it is curious, therefore, to observe the relative complacency with which we tolerate the development of tactical atomic weapons and to compare this to the horror that the thought of biological or chemical warfare excites. This deeply ingrained disgust has not blocked the development of chemical warfare; it has only caused it to become very secret. Today there are at least 13 nations experimenting in the field of biological and chemical warfare.

Only two major nations, the United States and Japan, have failed to sign the 1925 Geneva Convention prohibiting gas and germ warfare, and the United States has approved a 1966 United Nations resolution that included many of the points of the Geneva protocol. Nevertheless, research continues and it is not really very reassuring to be told that this work is purely defensive in nature.

Apologists for the use of chemicals in war usually point first to the mortality statistics of World War I. Gases used in this War caused much sickness, but the explosives were decidedly more lethal. There is, however, no comparison between the mustard gas of World War I and the nerve gases of today. An effective anticholinesterase interferes with the functioning of the entire nervous apparatus. If air containing 25 mgs of Sarin per cubic meter is breathed for one minute, death of half the population will result. A single drop of Sarin will kill a man in 30 seconds; Soman is even more toxic, and conventional gas masks are useless against all of these gases. The apologists then point out, and much more to the point, that the installations of the enemy are not destroyed. Only the nervous systems of the inhabitants are damaged.

The only antidote effective against a nerve gas is an anticholinergic chemical, and it is because of this that atropine is issued to modern soldiers operating in situations in which the use of these gases is thought possible. The civilian population is largely unaware of their existence and is therefore totally without resources for dealing with nerve gases should there be general exposure to them.

Meanwhile, research goes on. The Rocky Mountain Arsenal at Denver is capable of manufacturing Sarin. Another plant with similar capability is located at Newport, Indiana. The U.S. Air Force has thousand-pound bs that break into 76 gas-filled sections on explosion. Each fragment descends by parachute so that none of the gas canisters will be buried on impact. (78) The Russians are also well equipped with nerve gases and the means to transport them to their targets. Both the Americans and the Russians can deliver nerve gases in mortars, land mines, artillery shells, rockets, and bombs, and in aerosol sprays mounted on aircraft.

Although further research is proceeding, there is very little information available on recent developments in this field. The chemical defence experimental establishment at Porton Down in England, the Army Chemical Centre at the Edgwood Arensal in Maryland, the Suffield Research Station in Alberta, the Dugway Proving Ground in Utah, the plant at Muscle Shoals, Alabama, and all the other establishments that study, manufacture, and test these chemicals are silent indeed. But the goal everywhere is the creation of an extremely lethal gas that can suddenly be distributed over a wide area. That this objective can be achieved seems certain.

TO INCAPACITATE OR TO KILL?

Another objective has been the creation of a poison that would harass and incapacitate an enemy without actually killing him. To this end the various hallucinogenic drugs have been tested in military research centres, in the hope that one of them might be useful in disorienting an enemy, if not in reorienting him politically or causing him to plead for peace. The use of LSD is one possibility. In a number of ways, however, the hallucinogens do not satisfy the requirements of chemical warfare. They are probably not potent enough, and they do not incapacitate all of their victims to the same degree or with sufficient certainty.

It seems much more likely that the chemical weapons of the future will be poisons descended from the anticholinesterases. Although there has been complete security surrounding the chemical warfare research that various countries have been conducting in recent years, it seems likely that this is the group of drugs whose further development is being most avidly sought. An incident that occurred in Skull Valley, Utah, provides some evidence of this. One day in 1968, 6,000 sheep were found dead and dying 30 miles from the U.S. Army's chemical warfare test centre in that state. Pictures of the sheep showed that fibrillation of all muscle groups was a characteristic effect of whatever had caused their sickness. Although the Army would not definitely confirm that these sheep had been poisoned by one of the deadly nerve gases, it is interesting to note that the Army paid $500,000 to the owner of the sheep following the incident. It is an extraordinary thing that no human beings were also affected when this canister of gas was dropped accidentally by an aircraft a few miles off range.

The United States now has seven distinct antipersonnel chemical agents available for military use: GB (or Sarin) and VX (which was probably the material that went astray in Utah), plus the mysterious incapacitating agent BZ that is said to cause irrational behavior in its victims, the blister agent HD (mustard gas), and three famous riot control agents: CN (tear gas), CS (a superior form of tear gas widely used in Viet Nam), and DM (an agent that causes sneezing and vomiting).

In 1968 the British submitted a proposal to the 18-nation disarmament conference in Geneva to the effect that the production of biological weapons should be outlawed. Many responsible people today are convinced that the further development not only of germ warfare but also of chemical warfare should be discontinued. Only international legislation and control, however, could possibly achieve this end.

20.

Brainwashing

There are, as we have seen, many ways in which altered states of consciousness can be created in man. In general, any marked variation in the input of sensory stimuli, either in the direction of excessive stimulation or of sensory deprivation, can result in mental derangement. Such a condition is characterized by an immensely heightened suggestibility. The normal critical ability of the brain is diminished, and the individual is vulnerable to the introduction of virtually any new idea, even ideas he has previously rejected.

It is interesting to note that these symptoms have been observed and exploited for centuries; both priests and princes have been aware of their value in achieving conversions. In various arcane rites of the ancient Greeks, for example, techniques were used that would have interested I. P. Pavlov. The men who conducted the Holy Inquisition knew well how to break a man down so that his mind could be resynthesized according to their desires. John Wesley, the preacher whose ideas and methods swept across England in the eighteenth century, used techniques that were remarkably similar to those employed by brainwashers two hundred years later.

Pavlov himself, working with his dogs, established the fundamental importance of conditioning in the learning process. Pavlov's approach to animal physiology achieved a predominant position in the Soviet Union; from there his ideas spread strongly to Communist China and weakly to the Western world. By the application of certain Pavlovian principles, the primitive methods of the Holy Inquisition were refined, resulting in the development of the formidable techniques of modern brainwashing. (79)

HOW THOUGHT CONTROL IS ACHIEVED

If thought control is what a religious or political system desires, then it must first be recognized that the individual adherent or citizen is a sinner or a deviate. Eventually, the miscreant himself must also come to understand this basic truth, and he must experience guilt concerning his various crimes. In the beginning he need not feel at all that he is a guilty sinner, but through the development of dependence on his superiors he must learn this fact. Now the educational approach must not appeal to reason. Reason is controlled and restrained and even leisurely. The attack must be utterly emotional and it must result in the release of massive emotional discharge. In short, the individual must inhibit his rational mind and begin to react to his new environment in terms of raw, uncontrolled emotion. Accordingly he is harangued by repetitive questions and demands. He is denied rest, food, or comfort of any kind. His normal environment is completely lost to him. Nothing is familiar. He is told that failure to bend to the will of his instructors will result either in hell-fire and damnation or in hard labor for life, or possibly in torture and execution. He must review his past and confess every error in detail. He must disaffiliate himself from the evil ways of thinking and acting that once characterized him and that still characterize his former associates and relatives. He must achieve a wholly new view of reality.

In the course of his treatment the individual begins to recognize the hopelessness of his position, and he begins to despair. In a state of high anxiety, perhaps even terror, his body weak from fatigue and hunger, he reaches a point at which rational thought is suspended. He becomes, in fact, extraordinarily suggestible. His instructor then benevolently assures him that there is, in fact, hope. If he will only follow him, the divine peace of Christ's heaven will open to him or, in the virtually identical political situation, the glorious peace of honorable, right-thinking citizenship will be his. Sudden conversion is commonly the result.

However, his conversion may be shortlived; reinforcement is strongly indicated. Accordingly, repeated sessions are held in which again and again the subject reaches that point of enlightenment in which he confesses to everything, renounces his past, and gives himself to the power of the authority. In the course of time his belief in this view of reality will be very deeply ingrained and exceedingly resistant to eradication.

FACILITATION WITH DRUGS

Techniques of this kind are of interest here because drugs have been used for centuries to facilitate the achievement of the state of mind that is essential for instantaneous conversion. For this purpose the ancient Greeks commonly used hellebore to cause dreadful sickness through excessive purgation. Alcohol is another drug which has been used to inhibit conscious control. In psychiatry, Pentothal sodium has frequently been used to promote abreaction in the course of psychotherapy. Ether and nitrous oxide have also been used for this purpose, as have numerous other chemicals including LSD.

Most of the reports on such work with psychoactive drugs have been extremely favorable; but they have been subjective. Well designed, controlled studies have failed to support the idea that LSD has therapeutic value in psychiatry. That such drugs can effect profound changes in the personalities of individual people and consequently in their life style has, however, by no means been denied.

It was in the course of considering such matters that I developed a theory of chemical conversion. (80) This theory is very clearly speculative and it is to be hoped that objective studies will be carried out with a view to testing the validity of the series of hypotheses on which the theory is based.

CHEMICAL CONVERSION

This theory derives from the observation that there are a number of remarkable similarities between the procedures and effects of such apparently diverse social phenomena as evangelism, political brainwashing, the dance trances of primitive societies, and indoctrination into the modern drug-using community. It may be observed that in all of these circumstances the altered state of consciousness (ASC) is a common occurrence. Further it may be hypothesized that alterations of consciousness, caused by a variety of means, may result in major personality changes. A person in such a condition appears to be highly vulnerable to conversion to a belief in the absolute rightness of new ways of thinking, feeling, and acting.

Some ASC experiences and their consequent changes in personality have undoubtedly been adaptive. The people so affected have been caused to lead more humane lives. Perhaps, freed from incapacitating guilt and anxiety, they have been more productive and better able to cope with life in the world. Other ASC experiences have been socially maladaptive. The dancing epidemics of the Middle Ages, the berserk madness of the Vikings, the mass frenzy of the Nuremberg rallies, and the self-mutilation of the Aztecs come to mind. The conversion of immature or disturbed people to the passive, illness-accepting, and non-logical creed of the drug-using subculture is, in my view, socially maladaptive.

We have in our society today an increasingly large number of people who have disaffiliated themselves from the major institutions of that society. These people have examined the values of the society and have found them to be unacceptable. Such philosophically alienated people have concluded that passive withdrawal from the iniquitous society is utterly necessary; they have become, accordingly, true hippies.

In the last few years communities of such like-minded people have appeared in many North American cities. However, the composition of such centres as the East Village, Haight-Ashbury, and Yorkville is by now extremely varied; at least four additional groups of people have been drawn into them. The effects of belonging to the alienated subculture and of drug use will be quite different for each of these groups.

THE ALIENATED SUBCULTURE

Immature people are especially attracted to this subculture. For many of them it is easier to retreat passively than it is to respond adaptively to the realities of adult life. In the past young people have been strongly encouraged to accept these realities and to strive competitively for a place in the society. With the widespread attitudinal changes that occurred in the inclusive society following World War II, the value of such goal-directed behavior was questioned. Personal experience and the expression of spontaneous feelings were increasingly honored. What has been called the progressive system of education has been gradually replacing a traditional system that promoted discipline, competition, and goal directedness. As a result of this and many other factors, many adolescents have come to adopt an outlook on life that rejects all forms of authoritarianism.

The alienated subculture also attracts great numbers of mentally disturbed people. These people are then discouraged from seeking assistance in the inclusive society because it is widely held by members of the subculture that the very concept of mental illness is a typical example of oppressive rationalism.

The subculture also attracts an increasing number of socially disadvantaged people who are seeking some sort of status and security. Sociopaths also find an agreeable justification for their anti-social behavior in this community.

In very general terms, then, this is the composition of the subculture. It is a counter-culture, an alternate society; and it is known that the more closely affiliated a person becomes with this culture the more alienated he becomes from the inclusive society. The explanations for the intensity and persistence of this attachment to the values and behavior patterns of this subculture have consistently failed to refer to what I have called the conversion factor.

THE INITIATION

To examine this matter, we might consider what happens to a person who is motivated through pre-existing alienation to join the drug-using subculture. He joins a group of people sophisticated in the ways of the admired life style. The discussion centres around the evils of the inclusive society. There may be revelations of former crimes of thought and action. Rhythmical drumming, amplified sound, and flickering lights may bombard the senses. A decidedly erotic element is super-added.

The novice wants to belong; he wants to expand his senses; and he wants to become an enlightened member of the new society. Though there are no true leaders in the group there are, nevertheless, certain members who, by virtue of their perfect withdrawal from the larger society, are especially admired. The guru is a man who presents himself as a guide and whose solution to the problems of living may be emulated.

And then the sacrament is introduced. This is a chemical the use of which is proscribed and for possession of which severe penalties are provided. This introduces an element of fear and serves to heighten the emotional content of the ritual. The sense of separation from the larger society is reinforced by the knowledge that the beloved drug is condemned by the mindless and threatening society. The group is reminded of its own martyrs, people otherwise similar to those present who have been pursued by the hated authorities.

The psychoactive drug is then ingested and in the course of time the normal operations of the mind are suspended.

THE NATURE OF THE ASC

1. *Changes in the Processes of Thought.* There is an inward shift in the direction of attention and a conse-

quent preoccupation with internal images and ideas. Reality testing is clearly impaired. In effect, the subject begins to engage in non-logical or primary process thinking. Incongruities co-exist and the distinction between cause and effect is blurred. External reality becomes progressively more peripheral, and rational thought is suspended.

2. *Loss of Control.* With the value of the external world degraded, the subject experiences helpless isolation. He may be overcome with anxiety and feelings of impotence and he may resist this force that seems to be pulling him toward chaos.

3. *Changes in Time Sense.* Time may seem to be infinitely extended or collapsed. It may stand still or even run backward.

4. *Body Image.* Every variation may occur, from the conviction that a part of the body is shrunken or distended to the conviction that the limits of the body have rushed outward to enclose the universe. In any case derealization and depersonalization occur, and these may be fascinating or terrifying or both.

5. *Disturbed Emotion.* Massive upsurges of primitive emotion occur. Such uncanny emotions as awe, terror, horror, and loathing are common. Emotion will range from ecstasy to abject depression to rage.

6. *Changes in Perception.* In the ASC, regardless of its form or cause, distortions of sensory perception commonly occur. Thus there are illusions and, frequently,

hallucinations. Synesthesias may also occur in which one sensory modality is translated into another.

7. *Feelings of Rejuvenation.* One of the primary social goals in the production of the ASC is purification. Thus if the dancer is possessed by a spirit, or the supplicant has sinned, or the patient has been sick, he will emerge from the ASC with renewed hope. He has died and now he is reborn. This common characteristic of the ASC is crucially important to the theory of conversion.

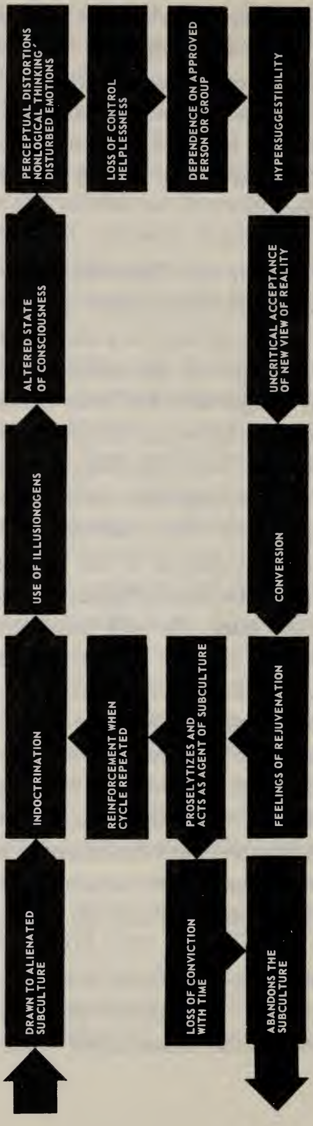
8. *Changes in Meaning.* As thought retreats from the external world and comes to depend on memories and interior images and ideas, a vastly increased significance is attached to such subjective experiences. Thus a non-logical conviction of the value of inner illumination and insight develops and this, of course, is not corrected by any objective comparison with reality. External cues, to the extent that they are observed at all, may be given false significance. Ideas of reference (the impression that the actions of others have reference to oneself) and other delusional ideas may be explained on this basis. The most important aspect of this process, however, is the tendency of the subject to be absolutely convinced that his interpretations are correct. In cases of religious conversion and drug-assisted mysticism this conviction of utter certitude is vitally important.

9. *The Ineffable.* Very commonly the subject, on returning to the world after an ASC experience, insists that it cannot be described. Indeed only another person who has had the experience, he will hold, can possibly know what it was that he has been through. This is

important. The sense of belonging engendered by this characteristic has much to do with what has been called the cultogenic nature of certain drugs. A bond exists between the initiates and no explanation is necessary. Those who are not initiates cannot have any comprehension of the matter; nor indeed can the experience even be described.

10. *The Occurrence of Hypersuggestibility.* As the profound changes in personality that have been described above proceed, there is a concomitant reduction in the effective range of the subject's critical ability. He cannot any longer test his ideas against reality nor can he distinguish between subjective and objective reality. Yet he has some persisting awareness of his incapacity to make judgments and hence he senses a need for support. In this condition he will willingly place his trust in the person of the shaman, the leader, the interrogator, the demagogue, the therapist, the hypnotist, or the guru. He will importune this strong figure for guidance and he will accept uncritically the instructions proferred. Furthermore he will ascribe to the leader progressively more omnipotent powers as his own self-boundaries dissolve. Finally, as the subject's image of himself diminishes to nothingness, he will imagine himself to be a being incorporated within the infinite dimensions of the omniscient godhead. In this condition, the wishes and commands of the leader will be uncritically accepted *as though they were the subject's own.*

Now the authority may be an actual person or it may be a philosophical, religious, or political idea. It may, in some cases, be the silent inner voice. The identity


DRAWN TO ALIENATED SUBCULTURE
INDOCTRINATION
USE OF ILLUSIONOGENS
ALTERED STATE OF CONSCIOUSNESS
PERCEPTUAL DISTORTIONS NONLOGICAL THINKING DISTURBED EMOTIONS
LOSS OF CONTROL HELPLESSNESS
DEPENDENCE ON APPROVED PERSON OR GROUP
HYPERSUGGESTIBILITY
UNCRITICAL ACCEPTANCE OF NEW VIEW OF REALITY
CONVERSION
FEELINGS OF REJUVENATION
PROSELYTIZES AND ACTS AS AGENT OF SUBCULTURE
REINFORCEMENT WHEN CYCLE REPEATED
LOSS OF CONVICTION WITH TIME
ABANDONS THE SUBCULTURE

of the authority is not as important as it may seem. The subject fabricates the nature of the authority, and this puissant influence is little more than an idealized construct designed from the fantasies in the subject's mind. The authority is assigned all of his power by the subject himself. The authority may in fact have no power himself; even if he has some power, his assigned omnipotence will far exceed the limits of his actual authority.

The most important point here is that the subject will tend to act as an agent of some external authority. As such, no sense of personal responsibility will inhibit his behavior. He will, in this role of agent, uncritically carry out the orders of the supreme authority. These instructions may guide the subject to utter passivity; but, as will be seen, they may also drive him to the commission of extremely disruptive acts.

THE CREED

In any case, in the course of his intoxication, everything is confirmed and the novice's membership in the cult is assured. Very commonly no conflicts remain; but even if some do, the conversion is reinforced when the entire experience is repeated in the following weeks. The subject may have been young, or he may have been sick. The drug does not discriminate. He is now a believer in all that is repeatedly taught to him by his fellows. He may, for example, subscribe to the psychedelic creed. In that case he believes that the discriminating use of marihuana and LSD will allow him to expand his mind to an extent that would never otherwise have been possible. He no longer believes in any concept that relates to the authority of the establishment. The police and other figures self-appointed or appointed by the establishment represent the enemy. Every individual must be free to decide for himself what is best for him. Discipline is intolerable. He emphatically does not feel that gratification of any desire or appetite should be postponed. Sex, for him, is unrestricted by the false and hypocritical morality of the inclusive society. (81).

He believes that no one can or should change anyone else. Everyone must be free to determine for himself the quality and course of his own life. He believes that the larger society is irredeemably evil and that no compromise can be made with it. And finally, to the extent to which his creed can allow him to consider an activist position, he believes that everyone should recognize the virtue of his philosophy. Everyone in the world should adopt his life style in detail and then, at last, there will be universal peace and love.

It is the fact that those who subscribe to part or all of this creed do so with uncritical certainty that should make us suspicious of its roots. These people seem to resemble very closely those who have in the past achieved the closed mind through the agency of a brainwashing process, be it primitive or sophisticated.

THE CONSEQUENCES OF CONVERSION

For an immature person who has already experienced difficulty in coping with the problems of living, conversion to a creed that promotes passivity and further withdrawal cannot possibly be seen as conducive to maturation.

For people suffering from clinical psychiatric illnesses, the uncontrolled use of drugs is much more likely to be anti-therapeutic than therapeutic. The use of drugs in this way will obscure the need for treatment. Moreover it will, in all likelihood, facilitate retrogression. (82) The concealment of the sick person in the drug-taking community is another matter of the greatest significance. And finally the intoxicated or converted behavior of these people will tend to reflect the nature of their underlying illnesses. A very wide spectrum of effects may therefore be predicted and some of these will be very destructive from a social point of view.

For the socially disadvantaged the expression of the drug effect might very well be more a reflection of pre-existing hostility and aggressiveness than of the behavior characteristic of the hippie community. In such groups today the violence that is increasingly seen may be a more predictable reaction than would be the withdrawal into passive oblivion that was described in New York in the early 'forties. This change may be accounted for in part by the transition from utter hopelessness to a belief in the possibility of social change. The concept of social action and the impatience characteristic of our time might produce a very different drug effect from that which was identified in New York thirty years ago.

In the case of the sociopaths, the acceptance of the hippie creed is largely expediential and transitory. Yet their identification with a movement that is in a number of respects antisocial is agreeable to them, and it serves as a screen for their deep-seated symptoms of psychopathy. In this group one would also expect to see the translation of former varieties of socially disruptive behavior into bizarre and distorted patterns. In the case of the conscienceless man the psychoactive drugs do not promote ethical and humane behavior; they are far more likely to engender the exhibition of grotesquely unprincipled behavior.

THE CONVERSION FACTOR

A number of workers have concluded in recent years that the use of marihuana is in itself not hazardous. They have observed that it is habituating in the cases of certain vulnerable people and that its use tends to reinforce a pre-existing tendency toward passive withdrawal from society. If, however, the altered state of consciousness that is caused by marihuana does indeed serve to crystallize the user's perception of a socially maladaptive view of reality, then the significance of marihuana may have been underestimated in recent years. In particular it may be noted that marihuana use tends to create a receptive attitude toward the use of LSD. The cataclysmic effect of this drug, and of the other hallucinogens, is overwhelming; and the possibility of conversion may be very great in the course of their use. That this may be so is suggested by the fervency of the habitués, the tenacity of their devotion to their movement and their drug, the utter certainty they have in the rightness of their beliefs, and their strong tendency to proselytize. It is as though they were subscribers to a new religion which teaches passivity, withdrawal from competition, the rejection of logic and rationality, the immediate gratification of personal urges, or violence and revenge. The sacrament of this religion, whatever its form, is a mind-altering chemical, the agent of its believers' conversion.

At the conclusion of this discussion I must again point out that the conversion factor has by no means been scientifically established. It will be necessary to conduct studies into the effects of the hallucinogens and illusionogens on human subjects to determine to what extent these drugs do promote attitudinal changes. It seems likely that in the next few years many such studies will be carried out. In the meantime it can only be hypothesized that the use of psychoactive drugs facilitates conversion and that this factor is one element in the creation, diffusion, and persistence of the alienated life style.

Part 5

RECREATION

21.

The Pursuit of Pleasure

Pleasure, in one sense, can be seen as a state in which discomfort is absent. Thus if an anxious person achieves comfort through the use of some chemical he will be grateful for this reward and his very relief will seem to him to be distinctly pleasurable. In fact, most of the chemicals mentioned up to now have been used in just this way to deal with religious or existential anxiety or to treat a great variety of disagreeable mental states. But most of these same psychoactive drugs will produce the intense sensation of pleasure known as euphoria if the dose is somewhat increased, and the achievement of this unusual state of mind may well become the primary goal for many erstwhile penitents and patients.

A person may, for example, begin by innocently taking an amphetamine to reduce his appetite. He is, after all, legitimately fat; he holds a prescription that confirms his medical need. Some reducers, however, eventually find a quite different use for their pills. Whether or not corpulence is checked, they continue to use amphetamines simply because it is pleasurable to do so. The drug confers a feeling of euphoria, especially if the dose is increased beyond the needs of appetite control, and this pleasurable side effect becomes the primary goal.

Similarly, a person may begin by taking a barbiturate in order to sleep; he may continue to use this drug because he enjoys the woozy detachment of barbiturate intoxication.

THE RECREATIONAL DRUGS

For a long time we were satisfied that there were two groups of chemicals and that most drugs had been assigned to their proper places within one group or the other. There were the medical drugs that were to be used to treat clinical conditions. These drugs were identifiably good; they assisted the physician in the performance of his good work. On the other hand, there were certain drugs such as alcohol and tobacco — recreational drugs — that were of no practical value. Their users were frequently harassed but in general the society seemed to resign itself to the conclusion that some allowance must be made for man's regrettable frailties.

Actually, every society has shown this pattern, but in the West it has been especially noticeable. In our society practical work has been particularly admired and we have tended to be quite suspicious of play. Indeed we have tended to organize play in such forms as to make it resemble work as much as possible. And so it has been with drugs. The "medical" drugs have useful work to perform; others are for enjoyment at times when we seek relaxation. Valium calms the distressed patient and this is undoubtedly good. Valium, therefore, enjoys uncritical acceptance. Alcohol relaxes the man who deserves to be rewarded for his hard work and this, it is now agreed, is similarly good. The use of alcohol, the pleasure drug, is sanctioned, but even here there is a tenuous connection with the accepted value of work.

PLEASURE FOR ITS OWN SAKE

The traditional values of our society, however, have been challenged. Over the past few decades, an increasing number of people have inclined to the view that pleasure is a thing desirable in itself. Not very long ago, for example, sex was considered to be an activity whose only proper purpose was procreation. Sexual behavior exceeding that limit was identified as perverse and sinful. Today he who would be perverse must show behavior that is extraordinarily imaginative and bizarre.

In the chemophilic society our values with respect to the search for chemical pleasure have undergone a very similar transformation. We still have our ancient and preferred recreational drugs, and these have flourished in the modern climate. Nicotine, it is true, has been roughly handled by the scientists; but until very recently it appeared that nothing could stop the triumphant advance of this drug toward nearly universal acceptance. Alcohol, as will be seen, is very secure. But now some "medical" drugs have begun to enter the field of recreation, and many of these drugs are vastly more potent as inebriants and euphoriants than alcohol. In an excellent study by Cooperstock and Sims of the Addiction Research Foundation in Toronto it was discovered that 32 per cent of all the prescriptions in that city were for mind-altering drugs including tranquillizers, amphetamines, barbiturates, and narcotic drugs. The tranquillizers alone accounted for 24 per cent of all drug prescriptions. (43) While this study did not distinguish between drugs obtained on prescription for legitimate medical purposes and drugs obtained in this way for recreation, it does at least indicate that a great many people are using psychotropic prescription drugs for one reason or another. It would seem that the search for pleasure through the alleviation of mental conflicts on the one hand and the direct experience of perceptual distortion and euphoria on the other is now a characteristic of our society.

THE IDEAL RECREATIONAL DRUGS

Drugs whose primary value is recreational (rather than medical) tend to be used socially. Small groups of people gather together for conversation and mutual support and in the course of this experience they use some chemical that confirms their membership in the group, promotes conviviality, and reduces social inhibition. Thus the ideal drug for this purpose would tend to be one that would slightly elevate the mood or reduce conscious inhibition without causing undue motor or sensory depression. Such drugs, however potent they may be when excessive amounts are taken, may readily be measured in gross amounts. The minimum and maximum amounts necessary for the desired effect may easily be learned by the participants, and the preparation and distribution of the drug is sufficiently complex as to require some visible activity. People, as a result, are involved in necessary rituals surrounding the use of the social drug.

It would seem that in many societies, and certainly in ours, the use of a potent mind-altering drug has been adaptive and hence socially useful. Alcohol, for example, has allowed people to suspend for brief intervals the rules of the ordered, achievement-oriented society. The drug has been used moderately and judiciously by most of those who have tried it, and its persistence as an essential cultural element seems quite certain. This is because alcohol satisfies most of the criteria with respect to the description of the acceptable social drug. It is easy to prepare in an unadulterated form, and its potency is such that most people can predetermine its effects with considerable accuracy. It can be taken orally and its cost is not prohibitive. Side effects can be controlled by the knowing user, and duration of action can be predicted. Treatment of overdose is possible, and the concentration of the chemical in the body of a user can be accurately determined.

Although alcohol is an extremely habituating drug for many people and the widespread abuse of this drug is the cause of much social disruption and unhappiness, the number of judicious users is far greater than the number of abusers. Most people report merely that the drug enhances appetite and aesthetic appreciation, relaxes the body, and agreeably reduces minor tensions.

Perhaps most important, however, is the fact that alcohol is a drug that appears to harmonize remarkably well with the essential style of Western civilization. Its use implies the desirability of brief periods of departure from the prevailing patterns of life; but its users do not thereby experience philosophic metamorphoses. The virtues of the competitive, aggressive life style are still recognized and no positive urge toward passive withdrawal emerges. Alcohol, in this sense, appears to reduce the pressures inherent in the Western style of life without reinforcing discontent and a desire to turn away from it.

This, of course, is an effect which appears to make alcohol very different from marihuana. In spite of the fact that marihuana also satisfies most of the criteria for the ideal recreational drug, Western society resisted its intrusion for 900 years after its use was discovered among the Arabic peoples in the eleventh century. Clearly this was because a drug that promoted passive withdrawal and introspection was simply not attractive to a people whose primary interest was in the aggressive exploration of the exterior environment. In light of this, it is revealing that now, in the middle of the twentieth century, this very drug has begun to interest our people for the first time. Surely this is not because marihuana itself has miraculously developed certain new pharmacological properties that make it more suitable for Westerners. Rather it is because Western society has itself experienced change. No drug can ever gain wide acceptance unless a receptive climate for it exists. And if this is so, and if a profound change has indeed occurred in our society, then our present legal position respecting non-medical use of certain psychoactive drugs will have to be extensively revised.

This is a very complex problem, however. Marihuana, for example, might become acculturated in our society if the laws forbidding its use were abolished. In that case the drug might eventually come to serve a socially adaptive purpose just as alcohol has done for centuries. On the other hand, the use of this illusionogen by progressively more diverse groups of people might well produce wide variations in the effects of intoxication. There is no reason to believe, for example, that passive withdrawal from reality would invariably be the result of marihuana smoking among groups of people whose primary impulse was to be aggressive and competitive. In fact, it might be hypothesized that an accentuation of pre-existing moods and urges would be a more likely consequence in such people.

The effects of any psychoactive drug will always be dependent not only upon the pharmacologic properties of the drug itself but also upon the personality of the user and the values inherent in his milieu.

EXCESSIVE USE OF PSYCHOACTIVE DRUGS

The civilized use of any chemical for recreation has usually excluded drunkenness, even though the religious and medical uses of these same drugs have often required marked intoxication. In fact, most of the social drugs are sufficiently potent as to cause their own peculiar forms of drunkenness, and for individuals and occasionally for groups of people this state has sometimes become a primary goal. The persistent use of such drugs in this way tends to diminish rather than strengthen the cohesion of the group and there appears to be an evolutionary process in the direction of control with limits placed on the degree of inebriety that is allowed. A strong society is maintained by the encouragement of personal restraint and the imposition of external controls. When the sum total of these influences diminishes, the society becomes vulnerable to deterioration from within or reduction from without. The current changes in the social use of alcohol and the hallucinogens in Western society in the direction of progressively less restricted use are interesting in this regard. If legal restraints are relaxed without there being any sign of the development of an attitude whereby self-discipline is seen as virtuous, then it may be supposed that our society is passing into a phase for which there are numerous historical precedents. However, perhaps the nature of their work inclines historians to be unduly pessimistic.

22.

Coffee, Tea and Chocolatl

Our discussion of the recreational drugs begins with the consideration of some of the more obviously benign of these. The use of tea, coffee, and chocolate appeared many centuries ago in three different parts of the world; today their social use is nearly universal. All three contain one or more varieties of a chemical structure known as the xanthine base. The xanthines are respiratory stimulants and dilators of the coronary vessels. They also have a central stimulating effect on the cortex, and thus the spirits of the user are raised and his fatigue is dispelled. The seeds of *Theobroma cacao,* the chocolate plant, contain theophylline. Coffee contains about 1 per cent of caffeine. The leaves of the plant

Thea sinensis contain two xanthines — caffeine and theophylline — amounting to about 3 per cent.

TEA

The tea plant is thought to be indigenous to India where it was planted on steep slopes on which no other useful plant would grow. The plant probably entered China about the third century A.D. after the Han dynasty had reached the subtropical region of the Yangtze Valley. The earliest credible reference occurs in 350 A.D. when tea was mentioned in the Erh Ya, the ancient Chinese dictionary. The earliest reference to tea in Japanese literature occurs in 539 A.D. The use of tea in China became intensely ritualized; in Japan it became an essential element in religion.

Myths surrounding the origin of tea are very ancient. Two of the legends are especially interesting and the reader is invited to make his choice from these. One concerns the Buddhist saint, Bodhidharma, a disciple of Gautama Buddha. After having been especially selected by the Lord Buddha to restore the original direction to the straying Buddhists of China and Japan, he set out on a famous journey and upon arriving in Nanking visited the Emperor Wu. The Emperor attempted to impress the saint by describing his various magnificent deeds in the cause of Buddhism, and he inquired of Bodhidharma as to the amount of merit these deeds deserved. With devastating simplicity the monk replied, "No merit whatsoever." The dismayed Emperor then asked which teachings of the Buddha were the most important. "The first principle of Buddhism is vast emptiness," said the monk. The Emperor, now outraged, demanded to know what right this wandering monk had to speak to an Emperor in this manner. The monk said, "I do not know," and left the palace forthwith.

Bodhidharma went into meditation in a damp cave for nine years; during this time he simply gazed at a blank wall. However, he became very troubled, in due course, by a sense of fatigue. His eyelids, he observed, were drooping. Recognizing the cause of his fatigue, he tore off his eyelids and dashed them to the ground. From these eyelids aromatic bushes grew, the leaves of which, when properly brewed, yielded a drink that could dispel fatigue. This drink, grown from the master's eyelids, was tea; and the ritual drinking of tea became an important element in the practice of Zen.

The other legend tells us that the discoverer of tea was a Chinese Emperor named Shen Nung. This ruler was said to have introduced agricultural implements and the tilling of the soil to the Chinese in 2737 B.C. He is also alleged to have been the compiler of a much referred to pharmacopoeia. Whether Shen Nung ever existed is quite uncertain, but there is no doubt that Shen Nung could not have introduced tea to China. The national drink of China is, in terms of Chinese history at any rate, of considerably more recent origin.

The Arabs were introduced to tea in the ninth century, but the English did not obtain their favorite beverage until the late sixteenth century. It was introduced as a novelty in one of London's two thousand coffee houses and was called tay or tee. In 1660 Samuel Pepys wrote, "I did send for a cup of tee, a China drink, of which I never had drank before." Later the English

East India Company established a virtual monopoly on the import of tea. The enactment of the Tea Act of 1773 which would have perpetuated the monopoly of the Company outraged the restless American colonists, and the result was the Boston Tea Party — one of the incidents that roused the colonists to further thoughts of revolution. Tea, it would seem, is a famous stimulant.

In every country outside of the Orient, tea was used solely in recreational ways. Groups of people would gather together to enjoy the refreshing and stimulating drink. Conversation would be promoted, and fatigue and worry would be reduced. Today the use of the drink is world wide. (83) (84)

COFFEE

The plant from which coffee is derived was indigenous to East Africa, but its earliest cultivation occurred in Arabia. According to legend, Kaldi, an Arabian goatherd, was disturbed by the peculiar behavior of his flock. He observed that they had eaten the berries from an evergreen bush and so partook of some of these fruits himself. He was immediately exhilarated and rushed away to tell the world that he had discovered coffee. The Mohammedans were pleased at first because their religious services were very long and tiring. However, the more orthodox scholars soon recognized that the drink was intoxicating and therefore prohibited by the Koran. Use of the beverage spread anyway and coffee became the national drink of Arabia.

In the seventeenth century the drink was introduced to Western Europe as a medicinal potion, but it gained wide popular acceptance with great rapidity. Indeed, the proliferating coffee houses of London became important political and cultural centres. These were places where wit, wise conversation, and good humor were especially honored. As a rule, alcohol was not sold in these places, yet their popularity continued for over a hundred years.

Coffee is undoubtedly an habituating drug. It has been shown that about one person in four depends on coffee to get him functioning in the morning. Until he drinks two or three cups he is inactive and irritable; following this he operates quite efficiently for a number of hours. It has also been suggested that about one in four housewives drinks from five to ten cups of coffee a day. It is interesting to note that if coffee is given to people who do not ordinarily use it, upset stomach and jitteriness are the results. For the person habituated to coffee, quite the opposite effect is seen. A few people drink 20 or more cups of coffee a day. In such cases, sleeplessness and irritability are quite common. Coffee is, after all, a central nervous system stimulant and one cup contains a therapeutic dose of caffeine.

CHOCOLATL

The Aztecs made a popular beverage called chocolatl. It was prepared from ground *cacao* beans, flavored with pepper and other spices. Prescott reports that the Emperor Montezuma "took no other beverage than chocolatl, a concoction made of chocolate flavored with vanilla and other spices." However, this drink was too bitter for the gentle Spaniards. Accordingly they added sugar to the drink. In the early eighteenth century, very fashionable chocolate houses appeared in the cities of Western Europe, but the drink was quite expensive and still not very palatable. The English added milk to it about 1700 and chocolate became the rage of Europe.

Interest in chocolate has obviously continued to the present day, but there is general agreement that nothing more mischievous than pleasure has been the result.

23.

Tobacco

Christopher Columbus observed the people of Cuba and Hispaniola smoking huge cigars, and later explorers visiting different parts of North America also found the Indians using tobacco. As has been noted in a previous chapter, tobacco was used as an important religious sacrament among the Amerindians, and this drug was probably also used purely for pleasure in many areas. It was, of course, owing to the tales of the explorers and the activities of the traders who followed them that the use of tobacco spread to Europe, first to Portugal and then to France. By 1600 the plant was grown and widely used in most parts of Europe, and Europeans, in turn, introduced its use into every part of North

America in which it was not already known to the aboriginals. Today the use of tobacco has become world wide and one mode of using it has almost completely displaced all the rest. The eating of the plant has virtually died out, and snuffing is rare. Chewing tobacco is generally confined to a few rural districts. The cigar and pipe account for only a small proportion of the trade. The cigarette is supreme everywhere, and the cigarette is the most hazardous form in which tobacco can be used.

NICOTINE

Nicotine is the most important ingredient in tobacco. After entering the system it is partly detoxified by the liver, but much of it is eventually excreted unchanged. Tolerance to nicotine develops rapidly. Uninitiated people become nauseated on taking 2 mgs of nicotine orally, while habitual smokers can tolerate up to 8 mgs orally. Even in a confirmed user, however, the smoking of only one cigarette has measurable effects traceable to the presence of nicotine in the body. The pulse will increase from five to 20 beats per minute, the systolic blood pressure will rise from 10 to 25 mgs of mercury, and the skin temperature will drop several degrees.

HAZARDS OF TOBACCO SMOKING

Tobacco smoke contains nearly 200 chemicals other than nicotine. The most important of these are pyridine bases, hydrocyanic acid, ammonia, carbon dioxide, carbon monoxide, various organic acids and aldehydes, and the tobacco tars and resins. The effect of this very complex aerosol on the body has been the subject of an enormous amount of research, particularly in recent years. The result of all this activity has been to incriminate cigarette smoking very seriously in the causation of a number of important physical disorders. The most useful compilation of the evidence against cigarette smoking is the U.S. Public Health Service Review of 1967 and 1968, entitled *The Health Consequence of Smoking,* which is based on two large American studies, a study of British physicians, and a study of a group of Canadian pensioners. This publication outlines the relationship of smoking to heart disease, brain hemorrhages, cancer of the lungs, larynx, lips, mouth, and gullet, chronic bronchitis, pulmonary emphysema, and several other conditions.

CARDIOVASCULAR DISEASE

The death rate from coronary heart disease is at least 70 per cent greater in smokers than it is in non-smokers. Cessation of smoking strikingly reduces the risk of dying from coronary heart disease. There is also much statistical evidence that relates cerebrovascular accidents to cigarette smoking.

CHRONIC BRONCHOPULMONARY DISEASE

Cigarette smoking is the most important cause of this disease, and smoking greatly increases the risk of dying both from chronic bronchitis and from pulmonary emphysema. Again, cessation of smoking results in a reduction of mortality.

CANCER

There is a marked causal relationship between smoking and cancer of the lung and, as with the other conditions mentioned above, cessation of smoking definitely reduces the risk of dying from this disease. Cancer of the larynx is also much higher among smokers. Cancer of the lips, mouth, and the gullet are also more commonly seen in smokers than in non-smokers.

OTHER CONDITIONS

There is an association between cigarette smoking and peptic ulcer. Although smoking apparently has some effect on the outcome of pregnancy, it is not yet clear whether or not this is deleterious. Women who smoke during pregnancy tend to have babies of lower birth weight than average.

There is also no remaining doubt that smoking is a most important cause of accidental fires. Estimates of the amount of fire loss due to smoking and the use of matches in the course of smoking vary from 19 to 25 per cent of all fires. Property loss and loss of life consequent upon this are immense. There is also some evidence that smoking diminishes visual discrimination, especially when the external light is relatively low. This might very well have an effect on night-time driving. The question of whether smoking has any effect on the incidence of industrial accidents has not yet been clarified, but further work may well demonstrate that such an association exists.

All of this can be summarized in general statements concerning life expectancy. It is now recognized that the life expectancy of young men who smoke two packs of cigarettes a day is reduced by eight years, while those who smoke half a pack a day will live four years less than non-smokers. The reduction in life expectancy is progressive between these extremes.

WHY PEOPLE SMOKE

There is really no longer any reasonable doubt that cigarette smoking is the main cause of lung cancer and that it is a primary factor in the causation of several important cardiovascular diseases. Every few months some new study is reported that verifies and extends the information already gathered. The public in due course is apprised of this new evidence and it reacts with brief jitters, renewed resolve, and failure. It would seem that the cigarette habit, once thoroughly learned, is exceedingly difficult to defeat.

Broadly speaking, smokers fall into three categories. Members of the *conformist* group smoke because everybody else is doing it and it seems to them that to be sophisticated they must at least feign the habit. The second group overlaps the first and could be described as *neurotic*. These people are tense, restless, and fidgety; it pleases them to engage in some socially acceptable act that requires limited activity. Members of the third group — the *dependent* — smoke because they actually obtain relief through the pharmacologic action of nicotine. If twenty minutes pass, they sense the need to replenish the level of this powerful substance in their bloodstreams. They actually suffer from minor abstinence symptoms and this impels them to light up yet another cigarette.

It seems likely that the peculiar effect of nicotine is such as to finally draw all or nearly all of the members of the conformist and neurotic groups into the dependent group. There is, after all, a progression which is typical of cigarette smoking, just as there is in the use of any other habituating drug. The user may begin using the drug for social reasons and he may then learn to enjoy the small rituals associated with the practice. Eventually, however, he will continue not because he still believes it is sophisticated to smoke but because if he does not smoke he feels irritable, depressed, and very nearly dizzy. Only another cigarette will suffice to reduce his urgent need, and this fact he powerfully overlearns. It is interesting that most smokers will readily admit that they do not especially enjoy their habit. In fact, the greatest number express a positive desire to stop. Yet they automatically continue smoking and whenever they do attempt to stop most of them manage to stay free of the drug for only a short period of time.

The fact that cigarettes are widely available and can be used nearly everywhere is undoubtedly one of the reasons why it is so exceedingly difficult to stop smoking. Usually, also, cigarettes are smoked in association with other pleasurable rituals such as coffee drinking, the use of alcoholic beverages, or the consumption of food. These associations are soon deeply ingrained and the ex-smoker finds himself under considerable pressure when he attempts to drink his usual cup of coffee without completing the ritual by smoking a cigarette. He becomes restless and dissatisfied and senses quite deeply that something is missing. He knows perfectly well what he is missing, and he also knows that with the expenditure of a relatively small amount of money he can completely satisfy his modest need. In terms of this one small situation the decision to smoke a cigarette does not seem to him to be a momentous one at all. As a result, he very easily lives from satisfaction to satisfaction and he cannot be convinced that any one cigarette can possibly be harmful to him. Of course he is quite correct: it is the cumulative effect of thousands and thousands of cigarettes that appears to do the actual damage to the body. Perhaps the difficulty is that the punishment for cigarette smoking is too remote and altogether too statistical. Such information does not appear to have much impact on a person who is innocently smoking a single cigarette with a cup of coffee.

PROGRESS THROUGH PUBLIC EDUCATION

It is clearly very difficult for a hardened smoker to give up his dangerous habit. The attack on this problem, while certainly not ignoring the wretched habitué, should probably be aimed at the younger people who have not yet decided to smoke. For some time it has generally been considered that to smoke was to give the appearance of being sophisticated and worldly wise. Advertisers of cigarettes have concentrated on the glamor, the elegance, and the manliness or womanliness of the smoker. As old religious taboos against smoking were swept away with the tide of free thinking that inundated our society in the 'fifties, the last remaining resistance to tobacco *ad libitum* disappeared. As a result the number of people starting to smoke increased steadily, and by the 'sixties perhaps 70 per cent of the adult male population used tobacco regularly. It was the most thoroughly condoned — even encouraged — form of drug habituation in our society.

In the 'sixties, however, the evidence from the researchers began to accumulate, and finally this evidence became overwhelming. Once cigarette smoking was found to be a primary cause of a number of dread diseases, the person who smoked somehow began to seem more foolish than glamorous. In the late 'sixties the United States government decided that the labels on cigarette packages must indicate that the practice might be injurious to health. This probably had only a minute effect. However, this was followed by extremely effective advertisements for television by the American Heart Institute and the American Cancer Society. When Canadian television networks discontinued cigarette advertising altogether in 1969, the image of the smoker as a healthy, carefree lover of life was damaged once again. Educational efforts of this sort are clearly the most sensible approach to the problem. If the smoker is redefined as a silly, unwise, helpless person, perhaps one of the main reasons for beginning to smoke will have been eliminated. Those who have been smoking for only a short time may also be discouraged, since it is quite easy to eliminate the habit in the first few months of its existence.

Nicotine is a potent drug; of that there is no doubt. Its influence on myriad bodily functions is very clear. The misery, medical costs, and economic losses resulting from the illnesses caused or aggravated by smoking are great. Yet nicotine differs in one essential way from most of the other psychoactive drugs discussed in this book. It does not cause drunkenness. The user of tobacco appears to threaten only himself. (In fact his illnesses cause absenteeism, he starts fires, and he sees less efficiently in the dark). Nevertheless, he is not at any time noticeably intoxicated; and therefore he does not seem to be a menace to other people or to the institutions of the society.

For these reasons, and perhaps also because he contributes impressively to the public purse, the smoker is not unduly harassed except by clamorous vital statisticians and students of pathology. Governments, apparently, are disinclined to interfere in any drastic manner with his inalienable right to engineer his own destruction.

24.
Alcohol

The three most widely used recreational drugs in our society are caffeine, nicotine, and ethanol. The effects of caffeine, as generally used, are relatively mild, but so is the pleasure it gives. Though nicotine does not cause drunkenness, it is viciously habituating, and there remains no doubt that it is physically injurious. Ethanol (alcohol), however, is the supreme and nearly ideal recreational drug. It can be ingested slowly in measured amounts, and this allows for civilized restraint. It is a drug that works remarkably well if relaxation and disinhibition are the desired goals. In moderate amounts it is not disruptive socially or injurious physically. No abstinence symptoms follow such light use and no craving need develop. Yet with continued use and continued increase of the amount consumed, all of these endearing characteristics vanish and the user faces dependence on a strongly intoxicating and habituating chemical that is damaging in the extreme.

Perhaps this is to be expected. The amount of mischief any chemical will cause will depend on variables such as the size of the population at risk and the potential for mental and physical derangement that larger doses of the drug contain. In the case of alcohol we deal with an apparently excellent and gentle drug that facilitates social intercourse, enhances the enjoyment of food, and requires visible activity in the course of its consumption. Alcohol, as a consequence, is the celebrant drug *par excellence.* It is not surprising that it became so thoroughly acculturated in the course of its long association with Western man and that its acceptance as a recreational drug has become so complete. Yet because it is so much more than a mild inebriant, it has produced and continues to produce great misery in our society.

A book on alcoholism published in 1966 contains a series of interesting statements describing some of the results of the misuse of alcohol in California and elsewhere. (85) This information is not particularly startling and indeed it is really common knowledge. However, because the statements are not in the least surprising it pleases me perversely to alter a single word in each of them. Thus, whenever the word *alcohol* is used I will substitute the word *marihuana.* The results are curious indeed.

Seventy million people in the United States use marihuana. Five million are marihuanics.

Ten to 15 per cent of marihuanics are on Pot Row.

Three out of four marihuanics end up unproductive with broken homes and jobs in jeopardy.

More than half of all the arrests in California cities are for intoxication with marihuana.

According to one study, marihuana was involved in 64 per cent of homicides, 70 per cent of physical assault crimes and 50 per cent of shooting and other assaults. . . .

Another study found that marihuana was involved in 41 per cent of cases of violent death . . . 36 per cent of suicides; (and) 49 per cent of auto casualties.[1]

Now, of course, in each of these statements the original reference was to alcohol, *not* marihuana. It was *alcohol*, for example, that was involved in 64 per cent of homicides.

By using this illustration I do not intend to suggest that marihuana is a benign drug. The inescapable conclusion, in fact, is that any potent psychoactive drug has the potential to be very disruptive to any society that condones its widespread use. As will be noted, it may well be that the number of people injured by a drug will, in general, vary directly with the overall consumption of that drug. It happens, at the moment, that alcohol consumption vastly exceeds marihuana consumption in our society. Should the use of marihuana increase, it is altogether likely that the problems referable to that drug would increase proportionately.

As of the early 'seventies, however, it must be said that alcohol intoxication and alcoholism are still overwhelmingly our most important drug-related problems. In fact, alcoholism is considered to be the fourth most important health problem in the province of Ontario. It is exceeded only by heart disease, mental illness, and cancer.

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[1] From Max Hayman, *Alcoholism: Mechanism and Management* (Springfield, Ill.: Charles C. Thomas, 1966), pp. 7-9.

DRINKING AND ALCOHOLISM

The occasional drinker uses alcohol only rarely. He drinks only at such special events as weddings and certain parties. The moderate drinker uses alcohol more often, usually at social gatherings; but he does not tend to exceed two drinks on any drinking occasion. The heavy drinker manages to use alcohol at various times throughout the day. He has a drink or two at lunch, honors the cocktail hour, and may have several more drinks in the course of the evening. In this way it is remarkably easy for him to consume over ten ounces of alcohol daily. There are well over 100,000 people in Ontario, for example, who consume between ten and 15 ounces of whisky or its equivalent daily. (86) (87) Whether these people may be considered alcoholic or not will depend on a number of variables. The alcoholic drinker drinks urgently. He consistently drinks more than he intended to do, and he is inclined to get drunk at inappropriate times and in the wrong places. In fact, he illustrates the three basic symptoms of dependence, tolerance, and loss of control. He needs alcohol, he is convinced, to function adequately; he comes to require more alcohol to achieve this end;

and he cannot voluntarily restrain his drinking behavior.

It is often the case that the alcoholic gains an inordinate amount of relief even on the occasion of his first drink. (88) Such mental discomforts as anxiety, depression, hostility, and feelings of inadequacy are miraculously relieved by the magic drug. The benefit is very real, and he is profoundly grateful. He remembers this reward and he continues, no doubt secretly, to drink therapeutically when the people around him seem to be drinking simply because it is the social thing to do. He begins to gulp drinks and prepares for a social event by drinking beforehand! He drinks at the event, and he drinks again later when he is alone. He tends to use alcohol to deal with progressively more minor stresses. Finally, of course, he reduces the number of responses to the greatest variety of circumstances to unity. He invariably drinks, and he becomes preoccupied with the need to do so. Along the way he suffers from terrible hangovers; eventually he experiences the famous condition known as the blackout. In this curious state the drinker seems to be functioning reasonably well, but later, when he is no longer intoxicated, he can remember nothing that he said or did during that period.

As time goes on, his drinking increases. He shows much irritability when he is not drinking; his hangovers become unendurable, and the blackouts become alarmingly frequent. Finally he often drinks alone; he desperately treats his hangovers with alcohol in the mornings; he often prefers to drink rather than to eat. His bouts of drinking become progressively more extended and chaotic, and finally one bout runs insensibly into another. He is nearly always drunk.

This process usually takes ten or 20 years, but in some cases the condition is so malignant that the progression from first drink to advanced alcoholism may be telescoped into less than two years.

Alcoholism is extremely complex. The approaches to an understanding of it have, accordingly, taken diverse forms. Thus there have been numerous clinical and epidemiological studies. There has also been a great deal of research into the biological and behavioral aspects of the condition.

Clinicians, perhaps understandably, have a distinct tendency to underestimate the importance of basic research. They observe that someone is conducting a study to determine the comparative susceptibility to alcohol of the cortical area and midbrain reticular formation of the cat, and they smile. However, there has recently been a growing understanding among clinical workers that alcoholism is multifactorial. It is no longer sufficient to point out that the alcoholic is depressed or hostile, or that he experienced emotional or social deprivation as a child, or that he endured an absence of adequate role models. We know today that some of the factors that determine his course in life are biological in origin. There may be inborn errors in enzyme functioning and there may be chromosomal abnormalities. Some people may be more vulnerable to dependence on alcohol than others. Research laboratories such as the one established by the Addiction Research Foundation in Toronto may yet discover a cellular basis for such fundamental characteristics of alcohol addiction as increased tolerance, the withdrawal syndrome, and loss of control. In any case the etiology of alcoholism is complex and no single factor can adequately explain it. Thus clinicians are now likely to be a little more accepting when a researcher, who may never have seen an alcoholic, spends months in his laboratory determining the effect of alcohol on ionic conductance in the squid axon membrane.

Studies into the effects of alcohol on cells, organs, and organ systems in animals and man must be far more extensive than common sense or the need for practical application would suggest. Treatment approaches must also be designed on the widest possible base.

THE TREATMENT OF ALCOHOLISM

The alcoholic is a person who has become dependent on alcohol to such an extent that he has begun to experience social, physical, or psychological maladjustment as a result of his dependence. He may or may not recognize that his health is being compromised, and he is unable to terminate his dependence on the drug. Though alcoholism is progressive, it is reversible for an extended period of time. Over the years, a great many treatment approaches have been advanced.

Usually the person who has become dependent on alcohol has some underlying emotional disorder: he suffers from anxiety and depression and the many equivalents of these symptoms. Generally he has used alcohol for a very long time to diminish the discomfort resulting from feelings of loneliness, inadequacy, sexual deficiency, hostility, suspiciousness, or self-consciousness. If his home remedy is taken from him, he will be left with all of his painful symptoms and no chemical to take for their relief. Consequently many people who work with alcoholics have used replacement drugs — in other words, some other chemical has been allowed to take the place of alcohol.

TRANQUILLIZERS, ANTIDEPRESSANTS, AND SEDATIVES

Many drugs are given to alcoholics, but not all of these preparations are effective. For example, although the phenothiazines have been very valuable in the treatment of psychosis, the same cannot be said for their use in the treatment of alcoholism. These drugs may be of some value in the treatment of the alcoholic who is psychotic and in the management of alcohol withdrawal; they have virtually no value in the case of the non-psychotic alcoholic or in treatment situations other than withdrawal. It is in spite of the negative findings of some workers using double-blind procedures and other controls that the extensive and quite unjustified use of the phenothiazine tranquillizers is being continued. Moreover, a number of studies have now established that the antidepressants are of questionable value in the treatment of alcoholism unless the patient actually suffers from a major depressive illness. There exist no adequately controlled studies that support the use of the sedatives, including the barbiturates, for any purpose other than the treatment of acute withdrawal symptoms. Thus the tranquillizers, the antidepressants, and the sedatives cannot be recommended in the long-term treatment of alcoholism. (Some interesting work has been done with chlormethiazole in Europe, but the value of that drug in treatment is by no means established as yet.)

TRANQUILLIZERS FOR SHORT-TERM USE

It would almost seem that psychopharmacology had no place at all in the treatment of alcoholism were it not for the appearance in the past few years of a series of drugs known as the benzodiazepines. These chemicals are described as anti-anxiety agents, and controlled studies have indicated more improvement among alcoholics treated with these drugs than among alcoholics treated with placebos. Of the three chemicals in this series that have now been adequately tested, it would seem that chlordiazepoxide or Librium is the least effective. This drug may have some use initially in the treatment of anxiety and in promoting the patient's willingness to accept further treatment. But the sense of well-being and relative freedom from anxiety that comes from Librium is generally short-lived, lasting only a few weeks in most cases. There seems to be no justification for the continuation of Librium treatment beyond this period. There are actually some reports that suggest that drinking increases with the use of this drug. Furthermore, diminished intellectual functioning is commonly reported, and some studies have noted a high rate of automobile accidents among patients on this drug. A definite dependence on Librium can develop in the patient within a very few weeks, and the development of tolerance has been observed. It is known further that the combination of the benzodiazepines with alcohol may result in degrees of inebriation that are decidedly dangerous. It would seem that Librium potentiates the depressant action of ethanol on the central nervous system. In short, this very fashionable preparation is by no means as effective as is generally believed, it sometimes results in some worsening of the patient's condition, it mixes poorly with alcohol, and it is habituating.

All of the same things can also be said about LA-1 or Mogadon and diazepam or Valium, except that these two benzodiazepines are more potent than Librium. In the best study comparing the effectiveness of these three drugs, Librium emerged as being just slightly more effective than the placebo. Valium and Mogadon were both significantly better than the placebo. As might be expected, the pharmaceutical houses are rapidly developing other chemicals in this series.

THE PROTECTIVE DRUGS

Beverage alcohol is metabolized in the body through several stages, ultimately yielding carbon dioxide, water, and a large amount of energy. During one of the intermediate stages alcohol is oxidized by a specific enzyme in the liver, producing acetaldhyde, which is highly toxic. Normally acetaldehyde is very rapidly broken down as it enters the bloodstream. It has been discovered that when certain drugs, especially Antabuse (disulfiram) and Temposil (citrated calcium carbamide), are introduced at this stage of alcohol metabolism, the process is inhibited, causing acetaldehyde to accumulate in the bloodstream. Accumulation of this toxic substance causes very unpleasant symptoms including muscle cramps, flushing, nausea, vomiting, and sometimes loss of consciousness. The patient may think he is about to die. The abstaining alcoholic who takes an Antabuse or Temposil tablet daily experiences, as a rule, only minor side effects. If, however, he attempts to drink even a small amount of alcohol he is soon stricken with the unpleasant symptoms mentioned above. The method is ingenious but unfortunately has not proven to be as useful in treatment as had been hoped.

A study by Yanushevskii reported that there was a 25 per cent remission after six to 12 months of treatment with Antabuse. This rate diminished almost to zero after two years. The fact is that only a patient who is well motivated to remain abstinent will continue to take his Antabuse or Temposil tablets daily. These drugs are therefore useful in the treatment of only a small percentage of alcoholic patients. Even in these cases it is always difficult to know what other variables may have had something to do with the patient's sobriety.

METRONIDAZOLE

In the original report by Taylor it was said that metronidazole or Flagyl caused a decrease in craving for alcohol, a decreased tolerance to alcohol, and certain changes in the psychic effects of alcohol. There never had been a drug that would cause an aversion to alcohol in quite this way, and thus a good deal of hope was engendered by this report and by a couple of others that followed soon after in 1966. It looked as though Flagyl would lead the management of alcoholism in an entirely new direction. Unfortunately the excitement about Flagyl was unjustified. Controlled studies have shown that there are no differences between the drug and the placebo in averting drinking.

Further investigation into the use of Flagyl is still warranted, but it can be said with some certainty that Flagyl is not the magical chemical we once hoped that it would be.

LSD

I suppose not many people knew about the revolution vaguely promised by Flagyl. On the other hand, another chemical has appeared on the scene in recent years to the accompaniment of truly sensational publicity. Everyone has heard about lysergic acid diethylamide and a great many people have heard of its application in the treatment of alcoholism. The earliest reports on the use of lysergide were almost rhapsodic. The results in the early 'sixties suggested that single treatments with lysergide produced substantial rates of recovery. It is only in the last few years that we have begun to accumulate a body of accurate information regarding the value of this remarkable drug. Van Dusen and Wilson reported in 1967 that if they had not had a control group their evaluation of results would have been mixed. Many of their subjects gave them accounts indicating that the LSD treatment had been one of the most significant experiences of their lives. Yet the follow-up showed that there was no significant improvement. The lysergide subjects were *not* more sober than the controls. An excellent study by Reginald Smart of the Addiction Research Foundation in Toronto reported substantially the same findings.

AVERSION TREATMENT

The rationale of aversion treatment is that if the drinking of alcohol can be associated with some unpleasant experience that occurs simultaneously, the patient may form a conditioned aversion to the use of alcohol. In the 'forties Voegtlin and his associates used emetic drugs, usually emetine and apomorphine. They presented alcohol in conjunction with these drugs in order to produce a conditioned response of nausea and vomiting. Voegtlin reported good results, but later studies failed to confirm the advantage of this form of treatment.

It is well known that traumatically conditioned responses have been produced in animals using strong electric shock as the unconditioned stimulus. This procedure typically alters not only the animal's physiological state but also his behavior. It has been postulated that a traumatic stimulus provokes fear based on an appraisal of a situation and that this might become associated with withdrawal behavior or a desire to escape.

For some years the drug succinylcholine chloride or Scoline had been used to produce complete muscular paralysis prior to the application of electric shock treatment. Because the experience of being unable to breathe was so terrifying, the patient was also given an anesthetic dose of sodium Pentothal. The idea was developed that traumatic conditioning could be produced in humans by injecting Scoline without the anesthetic and allowing the consequent paralysis of respiration to continue for up to 60 seconds, thereby producing a strong fear reaction. George Laverty, an A.R.F. researcher, elaborated this method by presenting alcohol to the patient before, during, and after the period of respiratory paralysis.

There are now a number of interesting reports from various centres on the use of several types of aversion treatment. Dr. Laverty has concluded that aversion treatment has not been shown to be decidedly superior to other methods of treatment. However, there seems to be some evidence that the patients who experienced the paralysis could control drinking to a greater extent than patients in a control group who were not given Scoline. The conditioned patients also showed a better work record. The most crucial finding was that while the conditioned patients resumed drinking, they tended to drink less than the patients in the control group. Again we can only say that this novel approach is far from being the elusive single answer to the problem of alcoholism. It appears, rather, that there is no single answer to this complex problem.

PSYCHOTHERAPY

Psychotherapy in its many forms has not noticeably improved in effectiveness in recent years. (89) Group therapies have nearly exhausted the possibilities of variation and recombination. Day care centres, outpatient clinics, live-in centres, psychodrama, and other approaches to the patient as a human being living within a social structure are still very much with us; but they have not recently shown new promise. Of all of the socially-oriented programs Alcoholics Anonymous is certainly the most effective. The contribution of this organization has been immense.

Ultimately the alcoholic must be seen as a man who has feelings and needs, and these human approaches are clearly designed to deal with him in these terms. The main problem in the clinical area is simply that there are too many alcoholics and too few workers in the field. As we have seen, there are over 100,000 people in Ontario who drink in excess of ten ounces of whisky or its equivalent daily. How many people are available to work with them? Very few social workers, ministers, rabbis, priests, nurses, doctors, and psychologists actually work with alcoholics. There are, after all, many other important social and medical problems. It follows, then, that we need a whole new group of people, whom we might call addictionists, to work with these patients. (In the fall of 1969, the A.R.F. in Toronto, and Mrs. Jean Dodds, undertook to establish a two-year diploma course in addictions in association with the George Brown College of Applied Arts and Technology. Students with diverse backgrounds were accepted, and the curriculum was not limited to the study of alcohol, as has tended to be the case in most other centres. Every aspect of the complex field of the addictions is studied at some time during the course.)

In treating alcoholism it is important to recognize the multi-factorial nature of its etiology. Of course it is a medical condition. Who can deny that cirrhosis and peptic ulcer and Wernicke's encephalopathy are medical disorders? But alcoholism is also a psychiatric illness. And it is a condition that interests anthropologists and sociologists and law enforcement agencies — indeed practically everybody but shoemakers (unless the shoemaker happens also to be an alcoholic). Thus I submit that it is now necessary for us to discard the strictly medical model into which we have attempted to press alcoholism since the passing of the moralistic and punitive period. Alcoholism is really an unusual disorder, and the specialists who will deal with it in the future will not invariably be doctors of medicine. Many will be addictionists, and there will need to be a very large number of such specially trained people.

THE PREVENTION OF ALCOHOLISM

Of crucial importance in considering the question of prevention is the work of Jan de Lint and Wolfgang Schmidt of the A.R.F. in Toronto. These workers have carried out major epidemiological studies themselves and have extensively reviewed the literature in their field. Their findings are very instructive indeed.

In the study of alcoholism, one of the greatest problems has been the determination of what actually constitutes an alcoholic. Various studies have attempted to define the condition in terms of arrests for drunkenness, hospital admissions, deaths from alcoholism, and deaths from alcohol poisoning. Of all of these the most reliable index of the prevalence of alcoholism is the incidence of cirrhosis of the liver. It would seem that there is a very close correlation between mortality from cirrhosis and the per capita consumption of alcohol in any society. There is, accordingly, a close correlation between the prevalence of alcoholism and the per capita consumption as well. De Lint and Schmidt arbitrarily define alcoholic drinking as consumption in excess of 15 centilitres of absolute alcohol daily. This figure approximates the consumption reported by alcoholic patients in treatment units. *It would seem that the prevalence of this type of drinking is invariably determined by the overall level of consumption in the general population.* (90) This is a very important statement.

Two other factors that can be shown to influence the prevalence of alcoholism are the accessibility of the drug and its cost. Preventive programs based on these findings must clearly promote the total or partial prohibition of alcohol drinking, or they must attempt to limit the number of places where alcohol is available, or they must encourage the levying of extremely high taxes on alcoholic beverages so as to greatly increase their cost. In a society such as ours all three of these actions seem disagreeable in the extreme. Yet it is exceedingly clear that where alcoholic beverages are freely and cheaply available the overall consumption of alcohol is high, the number of people drinking more than 15 centilitres of absolute alcohol daily is high, and the incidence of mortality from cirrhosis of the liver is correspondingly high.

Other variables, some of them famous ones indeed, are shown by de Lint and Schmidt to be relatively unimportant. They conclude that the widespread belief that certain drinking practices are associated with high or low rates of alcoholism is false. Thus in Italy children are given alcohol at an early age, and it is the custom to drink with meals. This is said to be conducive to a low rate of alcoholism. Yet in Italy the very high per capita consumption of alcohol is associated with a similarly high incidence of both cirrhosis and alcoholism. Indeed Italy is second only to France in this regard.

Another common belief is that the type of beverage consumed has something to do with alcoholism. The drinking of distilled spirits, it is held, tends to lead more certainly to alcoholism than the drinking of wine or beer. It can be shown, however, that in many countries in which drinking of wine and beer is characteristic, there are high rates of alcoholism. Spirits, for example, comprise only 4 per cent of the total alcohol consumption in Portugal, yet that country ranks third in terms of the numbers of excessive users of alcohol. In Poland spirits comprise 61 per cent of the total consumption, yet that country is far down the list, with about a third as many alcoholics per 100,000 people as Portugal.

Preventive programs designed to give information about alcoholism, to encourage beer drinking rather than the drinking of spirits, or to punish such behavior as drunkenness are not, according to de Lint and Schmidt, of great consequence. Quite simply, the incidence of alcoholism rises and falls with the overall level of consumption in any population. Only a reduction in per capita consumption would lead to lower rates of alcoholism.

It is remarkable that if the drinking habits of a population are plotted according to consumption on a graph, the result is what is called a logarithmic normal curve. This is clearly so in the case of alcohol, a profoundly acculturated drug. No such curve is available for marihuana, but the most intriguing question derives from the work of de Lint and Schmidt. Marihuana is also a major social drug in many parts of the world, and its use is spreading rapidly in our society. Would the same astonishing correlation between per capita consumption and drug-related problems occur in the case of this drug as well? Would the number of marihuanics vary directly with the overall use of the drug in the general population? I think it is extremely likely that it would.

However we must clearly note that of the many potent mind-altering chemicals available today alcohol is, for most people, incontestably the most agreeable. In our excitement and alarm about other drugs whose arrival on the recreational scene is more recent, it is very easy to forget how disruptive alcohol can be and to underestimate the amount of damage it is now causing in our society.

25.

The Spices

The French refer to all vegetable seasonings as *aromatiques,* thus obviating the controversy in English concerning the difference between a herb and a spice. There are at least 200 seeds, roots, leaves, and bulbs that are used to enhance the flavor of food. Their association with man is as ancient as that of any other chemical in this book. They have stimulated not only man's taste but also his urge to explore.

The Assyrians held that the gods drank sesame seed wine before they created heaven and earth. The Egyptians used various spices in food, as medicines, in perfumes, and in religious ceremonies. Eventually the Arabs established long camel routes from China and

India to the Roman Mediterranean world, but they consistently refused to disclose the sources of their expensive cargoes. In the thirteenth century Marco Polo discovered that the Arabs brought cinnamon and nutmeg from Indonesia, ginger from China, and pepper from India. The spice trade increased steadily, particularly after the Crusaders discovered the markets of the Middle East. Eventually it became an immense source of income for Venice. However, the Venetians caused the price of ginger, mace, and peppercorn to rise to such extremely high levels that various seafaring countries were stimulated to explore routes which avoided the Arabs, the Venetians, and the toll-charging castles across Central Europe to the west. Perhaps it would be foolish to say that Columbus, Vasco da Gama, and Cabot were primarily motivated by the need to find direct routes to the spice lands; but there is no doubt that they were aware that sources of these immensely valuable commodities would be open to them should they succeed.

In the sixteenth century it was the Portuguese who controlled the spice trade; in the seventeenth it was the Dutch. (During that period Amsterdam merchants chopped down 200,000 nutmeg and clove trees in the Indian Archipelago in order to keep the European price high.) In the eighteenth century the British took over the spice trade, but they were much annoyed by the fast American clipper ships that rushed from Java to London carrying pepper and other spices as well as tea.

The spices have always been mysterious and they remain so today. They contain a great number of complex chemicals and some of these chemicals have hallucinogenic properties. Perhaps not many people are familiar with the non-culinary use of certain spices. If celery seed, basil, bay leaf, allspice, mustard, saffron, and oregano comprised the entire list, then it would not be sensible to include the spices in this book. However, the spices include some surprising plants. Black pepper comes from *Piper nigrum,* a plant in the same genus as kava kava. It is said that cinnamon sticks are sometimes smoked in Mexico. But the most extraordinary thing is that a number of spices contain amphetamines that are astonishingly similar to mescaline. Such a list would include oil of anise, oil of citronella, oil of sassafras, and oil of parsley seed. However, the psychoactive properties of these and the other spices have not been demonstrated. All contain mescaline-like drugs, but in chemistry even minor alterations in structure can either abolish or enhance a particular action; in the case of these spices, the former would seem to have been the result. With oil of nutmeg the situation is quite different.

NUTMEG AND MACE

Nutmeg comes from the fruit of the elegant tree *Myristica fragrans.* This tree is native to a few islands in the East Indian Archipelago, particularly the island of Banda. The plant was established in Grenada in the West Indies in 1843, but about 70 per cent of the American supply continues to come from the East Indies, the product of that region being considered more potent, at least from a culinary point of view.

Nutmeg was a very important element in early medicine. The Arabs used it to treat everything from kidney disease to impotence, and the Hindus treated fever and heart disease with it. But these uses would seem to have been more magical than empirical. The drug continues to make startling appearances in folk medicine to this day. Though it has been discarded by Western medicine for 200 years, the notion that the drug can induce abortion persists. When this rumor spread throughout England and America in the late nineteenth century, there was a remarkable increase in the incidence of nutmeg poisoning. Though the drug cannot bring on overdue menstruation or induce abortion, occasional cases of young girls urgently eating a cupful of whole nutmeg continue to occur. Folk belief is very persistent, and if a need is felt to be very great, questionable remedies may be tried. (91)

The aspect of nutmeg that is of particular interest to us here is the intoxicating property of the alkaloids it contains. It has been suggested that nutmeg has been used as an inebriant in India for centuries. In the ancient Hindu scriptures, the Ayurveda, nutmeg is described as a narcotic fruit, and it is said that nutmeg is sometimes added today to betel chew in India and Indonesia. Enwrapping the seed of the nutmeg tree is a crimson network which is called mace. Mace has an aroma similar to that of nutmeg and contains essentially the same aromatic oils. It has also been widely used as an intoxicant.

THE CHEMISTRY OF NUTMEG

The chemistry of nutmeg is fairly well understood. The seed contains a number of terpene compounds and an aromatic fraction composed of ten chemicals. The aromatic fraction accounts for the psychotropic action of the drug. Of the chemicals that make it up, myristicine is the most abundant. In a pure form this chemical will produce psychoactive effects in six of ten subjects. (92) All of the chemicals comprising the aromatic fraction of nutmeg and mace are structurally very similar to mescaline and the amphetamines. It is possible that the terpenes in nutmeg account for the side effects.

NUTMEG IN THE TWENTIETH CENTURY

In Western countries there is a good deal of evidence that for decades prisoners have been stealing nutmeg from prison pantries. Although prison authorities denied this in the 'thirties and 'forties, in recent times they have admitted to having some knowledge of the practice; they have also locked their nutmeg and mace cupboards with particular care.

With the extraordinary change in the popular attitude toward mind-altering drugs that began to occur in the 'fifties, interest in nutmeg spread. Among large numbers of people the fashion for temporary loss of control became quite pervasive. A great many drugs were experimented with, including morning glory seeds, peyotl, marihuana, and LSD. It was quite predictable by the early 'sixties that nutmeg would soon be rediscovered.

Nutmeg parties and mace parties have occurred with increasing frequency in the last few years. An increasing number of people, undaunted by the information that nutmeg is nauseating as well as psychoactive, are entirely willing to try it at least once if for no other reason than to impress their friends with the report of their daring experiment. The mere availability of this drug may also help to account for much of its use. Though these drugs cause a good many very unpleasant side effects, some people undoubtedly do experience some pleasurable alteration of perception on taking substantial amounts of nutmeg or mace.

THE NUTMEG EXPERIENCE

If the prospective user should decide to take a chance, he will swallow any amount from a teaspoonful to a whole can of ground nutmeg. Because the onset of symptoms is delayed the nutmeg eater frequently concludes the drug has no effect and that, like banana skin, nutmeg is a hoax. Within two to four hours, however, he will be rewarded with some unusual mental experiences. There is some euphoria, excitement, and finally drowsiness. Visual and auditory hallucinations are rarer with nutmeg than with mescaline, but feelings of unreality and distortions of space and time perception are fairly common. Peculiar alterations of body image often occur in which the limbs seem to be isolated from the body or the entire body is projected to some otherwise unreachable place. Unpleasant side effects are very common. These include nausea, vomiting, headache, rapid heart beat, restlessness, and insomnia. These effects have been known to last for 24 hours. The side effects are so unwelcome that most people with a lasting interest in drugs that alter perception much prefer LSD or even marihuana.

There is, at the moment, no evidence that nutmeg eating is physically dangerous. Although nutmeg poisoning causes much discomfort, death has not occurred except in rare cases when a young girl has desperately eaten huge quantities hoping to induce abortion.

26.

Marihuana

It appears to be *de rigueur* for any review of marihuana to begin with the statement that the great Chinese emperor, Shen Nung, wrote a pharmacy book in 2737 B.C. and that this book contained a description of Indian hemp, the liberator of sin. Shen Nung prescribed this plant for a number of conditions including gout, malaria, beri beri, and constipation. He also suggested its use in treating a condition known as women's weakness, but the nature of this disorder seems to be unknown. Most amusingly, the father of Chinese agriculture also recommended Indian hemp for absent-mindedness, although something may have been lost in the translation of the name of this disorder into English. The problem that one must eventually face is that Shen Nung was probably a mythological figure. There seems to be no clear evidence that he ever existed. This may not be very important, however, because the reference is always made largely for ornament and also to indicate something of the antiquity of man's association with the hemp plant. Fortunately for those who write about marihuana, no one disputes the fact that Chinese medical practitioners used hemp centuries ago, and that eventually it became an important element in the practice of the Ayurvedic and Unani systems of medicine in India.

The alterations of consciousness that follow the use of hemp have led to its use in religion in many parts of the world. In Africa, cults have flourished in which the crucial sacrament was the magic kif or dagga. In North and South America a number of Afro-American groups have used the drug in the practice of their religious ceremonies. The Ras Tafari movement in Jamaica, for example, has used ganja for some time. In India, Hindu Brahmins commonly use bhang or ganja to facilitate the passive flight into the mystical state. In North Africa and throughout the Middle East and India, fakirs and religious mendicants frequently depend on the drug to maintain the appearance of holy other-worldliness. This has probably been the case for many hundreds of years, although it is not at all clear at what time the plant, indigenous to China, spread westward to India and from there to every torrid part of the world. Wherever it went it was welcomed by many holy men and the starving, sick, and despairing poor. At some point the Chinese began calling hemp the delight giver and the Indians named it the poor man's heaven and the soother of grief.

The cultivation of hemp spread inexorably. Eventually it reached South Africa, where it was called dagga, and later the New World where it was again renamed. In Brazil it was called maconha and in most English speaking countries it was called marihuana. In Jamaica the Indian name ganja was used. In that country the medical properties of the plant are the basis of an extensive folklore. Ganja tea is believed to cure many illnesses, including tuberculosis and venereal disease. On the sugar plantations, foremen are inclined to say that without ganja cigarettes they could not induce groups of men to harvest the crops.

Western Europe's introduction to the ancient Chinese herb probably occurred in 1090. The Crusaders were determined to liberate the Holy City of Jerusalem from the infidels. They succeeded not so much because of the superiority of their courage or their arms as because of the great disunity in the Moslem world at that time. In the eleventh century some Mohammedans followed the caliphs who succeeded Mahomet himself, and others belonged to sects led by powerful Turkish caliphs, while the Old Man of the Mountain, Hasan-i-sabbah, had decided to form yet another sect to oppose the two established groups. In the disorganization that followed, the pious Christians took Jerusalem and rejoiced at this evidence of God's favor. They also learned of Hasan's tendency to practise secret assassination and of his use of the intoxicating material known as hashish from Hasan's full name, Hashishin. The words *assassin* and *hashish* may be traced to the same fierce war lord — a leader whose primary purpose in life was to rid the Mohammedan world of false prophets and who used a certain plant to prepare his men for the acts necessary to achieve this great good.

The Christians were horrified when they learned of Hasan's methods, and when they returned to Europe they enthusiastically announced that yet another justification existed for the waging of the Holy Wars.

In the centuries that followed, Europeans were remarkably resistant to the use of hashish or marihuana. Though the plant spread to every other part of the tropical and temperate world it made virtually no headway in the aggressive, exploding culture of Europe. From time to time, isolated groups of bohemians formed small cultural societies in which they smoked hashish, and a number of celebrated literary figures tried the drug and reported their experiences; but the rhapsodic descriptions of such men as François Rabelais, Théophile Gautier, and Charles Baudelaire had no apparent effect either on the people or the priests. The drug made an inconsequential entry into Western medicine; in the nineteenth century it was used to calm anxious people and to treat a number of inflammatory and painful conditions. This largely folkish use was not altogether fanciful. The cannabinols do have a mild antibiotic effect and may be useful in the treatment of local infections of the ear, nose, throat, and skin, although the useful principle appears to be inactivated by plasma and the drug is therefore valueless in the treatment of internal infections. Marihuana also has a diuretic effect, and it has been known for centuries that its use increases the appetite. In fact Indian proverbs exist that warn the poor man not to use the drug for fear he will impulsively consume his meagre supply of food. In the West the main utilization of the hemp plant was in the manufacture of rope which was essential in the equipment of sailing ships. The oil from hemp seeds was used as a replacement for linseed oil in artists' paints, and birdseed was commonly composed at least in part of these seeds.

In every case, however, other products eventually superseded hemp. Thus the antibiotics were more efficient than the principle in marihuana. Rope made from plastic material was stronger and lighter than either sisal or hemp. The tranquillizers and antidepressants were able to reduce anxiety and elevate the spirits without affecting intellectual functioning. No practical use for marihuana persisted, and finally the World Health Organization Expert Committee on Addiction Producing Drugs advised that *Cannabis* should no longer remain in the pharmacopoeia. Long before this decision was made, commerce had actually lost its interest in the plant anyway. The decision was clearly in support of the United Nations' opposition to the one remaining use for the plant that had not been defeated in the field.

THE RECREATIONAL USE OF MARIHUANA

In every part of the world where the use of *Cannabis* is endemic, the drug is primarily valued by large numbers of people for its pleasurable intoxicating effects. The character of the intoxication will vary markedly with the dose, the potency of the material, the personality of the user, the nature of the setting, and the form in which the drug is used. The basic appeal of the drug derives from the fact that it alters consciousness. Usually a dreamy state of mind develops within half an hour of smoking *Cannabis* and this is commonly associated with some euphoria. The normal flow of logically connected ideas is interrupted and the user feels that his mind is escaping from his conscious control. Lost memory traces intrude and mingle with unrelated perceptions deriving from the present. The sense of time is altered in such a way as to become either immensely extended or telescoped. Distinctions between past, present, and future are blurred, and space may become either immense or astonishingly constricted. Most users report a pervading sense of adequacy. They feel more intelligent, more sensitive, and more perceptive. Mood is also altered. Gaiety increasing to joyousness may develop. A group of smokers may seem quite giddy and talkative, while individual users may actually experience a euphoria that expands to ecstasy. This commonly experienced sense of disinhibition, loss of concern for previous problems, and freedom from anxiety and depression is what is referred to as the high. Actually the quality of the experience will vary directly with the complexity of the person using the drug. Dull, unimaginative, limited people tend to report novel distortions of perception, some disturbance in time sense, and a feeling of joy. The experience, for them, is largely an ill-formed sense of pleasurable unreality. More imaginative people will produce complex, detailed, and literate fantasies and sensations. The writings of the American hashish eater Fitzhugh Ludlow provide excellent examples of this. Ludlow's accounts of his experience with *Cannabis* are soaring fantasies of surpassing beauty and hideousness.

The uninitiated person may strongly resist the tendency to lose control. He may be threatened by the thought that some people have been reported to become dangerous while intoxicated. He may question the motives of the people who supplied him with the drug. He may become resentful, anxious, and paranoid. As the drug pulls him steadily toward disassociation and distortion he may become panic-stricken or uncontrollably hostile. For him the physical sensations of dizziness and nausea, and the changes in sensory perception and body image may be terrifying. He may imagine that an irreversible psychosis really may occur or that he will die. Certainly the more extreme forms of this reaction are still quite uncommon, and aggressive outbursts, at least in North America, are very rare. The nightmarish marihuana reaction occurs much more often when other chemicals such as LSD or methamphetamine have been added to the cigarette or in situations in which the possibility of arrest are felt to be considerable. In agreeable settings where uncontaminated material is used, the marihuana reaction is typically mild, passive, and pleasurable. It is partly because the reaction is so commonly pleasant that the use of this drug has spread with such rapidity in recent years.

In a comfortable setting the naive smoker may well develop uncomfortable sensations, but he is quickly assured by his friends that these sensations are precisely what he should be seeking. He is, after all, motivated to get high and now his head feels enormously swollen or the shape of the room is oddly distorted or the music seems to be overwhelmingly loud and beautiful. This unaccustomed alteration of what his senses normally report to him may be frightening or at least unpleasant. He reacts with distaste, anger, or disappointment; but his friends assure him that he is merely succeeding in getting high. He must relax and let his mind flow where it will. He must cease his culturally conditioned tendency to resist disorder because beauty lies beyond the cruel limits of the controlled middle-class mind.

The first few times he tries marihuana he may exact no pleasure from the experience whatever; but eventually he may learn the technique and become a connoisseur.

However, the questions raised in the chapter on brainwashing must again be briefly noted. Marihuana creates the altered state of consciousness and in this condition the user may be vulnerable to conversion to the view of reality espoused by the people around him. It is possible that immature and naive people who are only marginally involved in the drug-using subculture may be insidiously and unwittingly recruited into it through the use of marihuana alone. It may also be true that the use of marihuana may serve to intensify the tendency toward alienation that has always characterized the adolescent's drive toward independence and the creation of a personal identity. It may be that among the known risks of marihuana use that the initiate is familiar with, and is prepared to accept, must now be included the possibility that his control over the consequences of use may be less certain than he had understood it to be. The process of conversion is not voluntary once the drug-assisted alteration of consciousness has been achieved.

MARIHUANA IN WESTERN SOCIETY

Some time in the 'twenties, migrant Mexican workers in such southern cities as San Antonio and Los Angeles were found to be smoking marihuana recreationally. This discovery was very quickly followed by the conviction that marihuana smoking was a dangerous, antisocial habit, and vigorous attempts were made to block its further spread. The drug was called loco weed and stories began to circulate in which wild-eyed youths ran amok with axes among innocent citizens. In 1923 marihuana was listed in the Opium and Narcotic Drug Act in Canada and that was that. In the United States, legislation was not more thoughtful but it was at least preceded by a decade or so of increasingly emotional argument. The Bureau of Narcotic Control undertook to inform the people of the dread consequences of using what it called "the killer drug."

Two major studies of the effects of marihuana were largely ignored by the proponents of marihuana prohibition. The first of these was the report of the British East India Hemp Drug Commission of 1898. That body concluded that the moderate use of ganja and bhang in India was not more harmful than was the moderate use of whisky. They felt that the excessive use of the drug was generally confined to the indolent and utterly impoverished classes. The Panama Canal Zone Study was undertaken in 1925 by the Americans, following the report that some of their soldiers were using the drug in that region. This U.S. Army report concluded that the excessive use of marihuana indicated and intensified mental instability, but it held that there was no evidence that the marihuana grown in the Panama Canal Zone was habit-forming in the sense in which the term was applied to alcohol, opium, or cocaine. The report said further that, "no recommendations for further legislative action to prevent the sale or use of marihuana are deemed advisable."

Federal control was established in 1937 with the passage of the Marihuana Tax Act. This Act made the importation, sale, and possession of marihuana entirely legal providing the importer, seller, or possessor followed in detail the most complex and intimidating series of procedures and paid taxes to the Treasury Department for every privilege allowed. The effect of the Act was to put the drug completely out of reach of everyone except those people who were willing to run the risk of violating federal law. Section 12 of the Act states that "any person who is convicted of a violation of any provision of this Act shall be fined not more than $2,000.00 or imprisoned not more than five years, or both, in the discretion of the court."

In 1961 the United Nations reaffirmed that marihuana was a narcotic drug and accordingly included it with heroin in Schedule 4 of the Single Convention on Narcotic Drugs. Countries signing this article of the Convention agreed to maintain in their domestic laws provisions for the punishment of people found in possession of marihuana. Canada was the first signatory of this document. In this country the Narcotic Control Act of 1961 provided that any person is guilty of an indictable offense and liable to imprisonment for up to seven years if convicted of possession or cultivation of marihuana and liable to imprisonment up to life if convicted of trafficking. A mandatory minimum period of seven years' imprisonment was provided for people convicted of importing the drug into Canada.

In spite of these punishments, the use of marihuana continued to spread. From the southern cities it drifted into New York and Chicago and became an important intoxicant in the large black ghettoes of these and other northern cities. The Bureau of Narcotic Control continued to circulate sensational warnings concerning the evils of marihuana. The drug was commonly used by high school students, the Bureau announced. Its use was a basic factor in the commission of such major crimes as homicide, armed robbery, and rape. Its use led inexorably to heroin addiction. The drug caused mental degeneracy and physical injury.

Instead of accepting these statements uncritically, the New York Academy of Medicine joined forces with the Police Department of the City of New York and undertook to study the entire question dispassionately. The principal objects of the study were to discover the exact extent of marihuana smoking in New York, its incidence among school children, its relation to crime, and its effects on people using it. It was discovered that the smoking of marihuana in New York was almost entirely confined to the Harlem tea pads. The users were generally without steady employment, lacked initiative, and were bored and convinced of the futility of their social situations. They smoked marihuana out of a need for distraction and they enjoyed the conviviality that it caused. The most common statement made by these men was that the marihuana made them feel more adequate. Their ages were between 20 and 30 and they frequented about 500 tea pads in Harlem. The investigators observed that the smokers were friendly and sociable and that belligerence was very rarely seen. If anyone did tend to become aggressive he was ejected from the tea pad. The smokers had generally learned to enjoy the high and disliked the sensation of being greatly intoxicated. They would, accordingly, strictly limit the amount of marihuana that they smoked. No relationship was found between marihuana smoking and the commission of major crimes. There was no appreciable use of marihuana in the schools. No withdrawal symptoms were noted if the drug was not immediately available, and no tendency to go on to the use of heroin was observed.

The second part of the study was clinical. Seventy-seven prisoners were given marihuana either in the form of an extract taken by mouth or in cigarettes. The most commonly reported effect of marihuana was a sense of well-being and unawareness of the surroundings, followed by drowsiness. There was also, as a rule, some difficulty in focusing and sustaining mental attention. The subjects were generally euphoric, good natured, and talkative; but occasionally this state would suddenly be interrupted by apprehension and uneasiness. In a few subjects anxiety and antagonistic behavior was observed, but most commonly the hostility was expressed verbally and there was no tendency toward physical violence. The physical effects included tremor, unsteady gait, dizziness, dryness of the mouth, nausea and vomiting, and hunger.

In nine of the 77 subjects psychotic reactions occurred. In six of these this effect was of short duration, lasting from three to ten hours. There was mental confusion and excitement of a delirious nature. Three unstable subjects developed psychoses that could not definitely be related to the use of marihuana. A number of other factors including epilepsy were involved in one case; a second subject developed a prison psychosis only after his return to penitentiary; and a third was a known drug addict with an unstable personality.

Various psychological tests showed that marihuana affected static equilibrium and hand steadiness. It also impaired intellectual functioning. Speed and accuracy of performance were diminished, acquired knowledge could not be used efficiently, and routine tasks could not be well carried out. Memory and the capacity to learn were adversely affected. It was concluded that marihuana was not a drug of addiction like the opiates. Tolerance was very slight or did not develop at all, and no evidence of physical deterioration was found. (93)

On the publication of this report the American Medical Association reacted editorially with a strong condemnation. The AMA insisted that Allentuck and Bowman, the researchers, had produced an incomplete, biased, and emotional report and that the position taken by the Bureau of Narcotic Control was the only right one.

RECENT HISTORY

Sometime in the 'fifties marihuana escaped from the bohemian quarters and the ghettoes and spread to the middle class white populations of Europe and North America. This was in itself a remarkable development because, as we have seen, this particular group of people had been strongly resistant to the introduction of this drug for nearly a thousand years.

At first the drug was largely restricted to certain neo-bohemian quarters in a few large cities. Such places as North Beach in San Francisco and later Yorkville in Toronto were similar in some respects to such older and truer bohemias as Chelsea, the Left Bank, and Greenwich Village. However, there can only be a limited number of exploring, creating artists and very rapidly the populations in these proliferating centres exceeded this critical point. Large numbers of people, mostly in their late teens and early twenties, assumed many of the attitudes toward society and toward the meaning of life that had previously characterized the artists (who had nearly always stood apart from the mainstream of the culture even as they determined its esthetic future).

These newer members of the alienated minority were not as a rule artists. Many of them were impressionable, immature and, especially in the beginning, unsuccessful competitors who had become casualties while they still lived in the larger society. In the 'fifties, however, such people found that a community had gradually come into existence that welcomed them and rewarded them with a sense of significance after all.

In the course of a very few years the sociological characteristics of a subculture developed in which it was possible to identify common values and common modes of behavior. These people tended toward a life style that was extremely passive and they tended to abhor any evidence of the persistence of aggressive impulses. Their romantic and perhaps even naive view of society and of reality in general brought them into sharp conflict with the vast and complex culture that surrounded them. As a consequence of this, they withdrew more determinedly and proceeded to refine a philosophy of life quite antithetical to any which prevailed elsewhere. They came to celebrate the immediate and the spontaneous, and they looked with increasing contempt upon people who willingly conformed to the energetic and goal-directed life of the larger society.

Members of the new subculture preferred to look within themselves in the course of their explorations of what they took to be the world. They honored nonlogical thinking and thus tended to accept magical explanations for natural events, in contrast to the procedures that characterized the powerful scientific culture from which they preferred to retreat. It was partly for these reasons that marihuana found an ecologic niche for itself in this small part of the white middle class.

Marihuana became a sacrament in the new religion of the hippies. To smoke was to defy the oppressive and organizing society. To smoke was to gain acceptance in an increasingly desirable and noticeable subculture. To smoke was to indicate one's agreement with the values of the new enlightenment.

But as the 'sixties began, the character of this small society itself underwent a succession of changes as quite diverse groups of people came to join or extend it. The chaotic history of the Haight-Ashbury district of San Francisco is an excellent case in point; but every community of this type experienced quite similar stresses in the course of the 'sixties.

During the same period the use of marihuana spread to the outcast motorcycle gangs and also to the universities. It began to make some headway at last in the ranks of people who had no intention whatever of escaping from the larger society. And finally it began its inexorable advance into the high schools.

It soon became apparent that New York in the early 'forties could not be compared to New York in the 'sixties or to any other contemporary city. The LaGuardia Report found no significant use of marihuana among high school students. In 1968 Charles Aharan in London, Ontario found that 7.9 per cent of the boys in high school in that city had tried marihuana and that 3.6 per cent of the girls had done so. I think we can assume that these are baseline figures and that by the end of the decade there was probably an even larger number of children who had experimented with these drugs. There is every reason, moreover, to believe that the prevalence of marihuana use is steadily increasing. In the San Francisco Bay area about 30 per cent of the high school students have now had some experience with marihuana, and in the schools of that region the general resistance to such use has diminished to the point of vanishing.

TWO EXTREME VIEWS

At the present time an absurd polarization has occurred with respect to the virtues or evils of marihuana. In one camp devastating announcements to the effect that marihuana smokers will become rapists and murderers are still the rule. Mental and physical degeneracy, it is said, is the inevitable result of prolonged marihuana smoking. The addicts, as even the most casual users are called, are certain to go on to heroin. Such people speak from positions of monumental ignorance. They do much more harm than good. When anyone who has the slightest interest in marihuana hears their pronouncements he merely laughs. And turns away. Most people now refuse to be guided by ignorant regurgitations of the uninformed outbursts of the 'thirties.

There is another group, aroused and vociferous, whose members speak from a position of comparable ignorance. These people hold that marihuana is the most benign, the gentlest, the most desirable drug that has ever appeared on the earth. A member of this group who happened also to be mentally disturbed managed to simplify this position quite beautifully for me one day. He said that he was now convinced that Adam and Eve had indeed been ejected from Eden because they had eaten of the tree of knowledge of good and evil. That tree, said my patient, was grass. It had to be because no other plant in the world could tell man everything there was to be known about good and evil.

Less troubled members of this camp insist, with greater sophistication but not much more logic, that marihuana is entirely harmless and that its legalization will be followed by joy, enlightenment, and peace in the world.

A MIDDLE POSITION

It is difficult to take a middle view because a decision to do so is held to be contemptible by ferocious people in both camps. Nevertheless, such a position is the only one consistent with logic and with the knowledge presently available. Some of the reasons, both for and against legalization, that seem relevant to those seeking a rational answer will be presented below.

1. Dr. Harold Kalant of the A.R.F. Research Department in Toronto has pointed out that it is misleading to discuss the use of such a drug as marihuana outside of the context of society's views and practices with respect to all of the mind-altering drugs. This is a crucial point. The use of marihuana is undoubtedly spreading in our society and this indicates that it has found for itself an ecological niche. It appears, therefore, to be useless to deplore this development and attempt to block forcibly its further growth through unthinking prohibition. Some form of control may be necessary, but its nature must be determined by the attitude that prevails in the general population. The law in democratic countries always tends to exclude as many people as possible from the criminal category. If an insupportable number of people come to be designated as criminal by the existing laws, then the laws are modified to exclude these people. It is unlikely, for example, that 10.8 per cent of the Grade 9 students in Toronto are criminals in the normally accepted sense of that term. Yet according to Reginald Smart of the A.R.F. in Toronto, that proportion of Grade 9 students used marihuana during a six-month period in 1968. There are probably even more criminals in Grade 9 by now.

2. Such variables as the climate and soil conditions of its place of origin, and the parts of the plant used, largely determine the potency of any given marihuana

preparation. The marihuana used in the United States and Canada is relatively mild. It is perhaps comparable in potency to bhang, the intoxicating *Cannabis* drink of India. The chief pharmacological agent is tetrahydrocannabinol and this material is largely present in the unpollinated female flowers. Preparations from the leaves of the plant contain very little of this chemical, while the resin excreted from the flowers is very rich in THC. Kif in North Africa, Ma Jen in China, dagga in South Africa, ganja in India, and marihuana in North America are composed of the chopped dried flowers and tops of the plant. Charas in India and hashish in the Middle East are composed of the pure resin, and as such they are many times more potent than the varieties containing much useless plant material.

The problem is that while American marihuana is a mild euphoriant and inebriant, other forms of *Cannabis* are clearly very potent indeed. The practice of smoking the local material may be benign, though the degree of intoxication will still depend on the amount smoked even if the material is relatively deficient in THC. Such a preparation could be used judiciously and in nearly the precise amounts desired by the smoker. The issue becomes far more complicated, however, when we recognize that a good many users of marihuana express a considerable preference for much more potent forms such as hashish whenever such preparations are available.

The fact that pure synthetic tetrahydrocannabinol is now available and has appeared on the streets enormously complicates the problem. This material is hallucinogenic and its effects are quite similar to those of LSD. If the smoking of marihuana is permitted, can the use of pure THC be prohibited? Would the uncontrolled use of THC threaten the security of non-using people? Of course, it is not impossible that given a range of potency the largest number of people would in fact choose the milder forms. This has yet to be established in this country, though in India the mild bhang is by far the most widely used form of the drug. The factor of cost may have something to do with this, but the fact that the more potent forms are outlawed may be the most important determinant.

3. Marihuana is, among other things, an habituating drug. At one time drugs were described as being either habit-forming or physiologically addicting. The latter term implied that the body tended to adjust to the presence of the noxious agent and thus would be markedly unbalanced by the abrupt withdrawal of the drug. Heroin is, of course, the outstanding example of this type of drug. Marihuana does not seem to cause addiction in this sense, but it certainly does cause the development of craving in some people. Today the World Health Organization prefers to refer to "drugs of dependence." Thus there is dependence of the morphine type, the marihuana type and so on. Dependence of the marihuana type implies psychological habituation. On withdrawal there are no physical abstinence symptoms but there is a strongly felt need to enjoy once again the pleasure of intoxication.

People who suffer from anxiety, depression, anger, and feelings of low self-esteem are especially vulnerable to habituation to any drug that will palliate these symptoms, and the euphoria and agreeable sense of adequacy conferred by marihuana are intensely seductive to such people. The fact that alcohol is habituating in precisely this way is relevant, of course, but it does not for a moment alter the fact that marihuana might also generate problems of this sort. Alcohol is indeed the supreme chemical problem in our society, and it will probably retain its preeminence in spite of the urgency and panache of its many challengers. There is really not much point in denying, however, that the marihuanic has already appeared in our society and that he may eventually become an important social problem. In Morocco, where it has been estimated that over 10 per cent of the adult male population smokes kif regularly, the existence of men who remain intoxicated continuously has long been observed. In short, the drug is not just a mild euphoriant for all of its users. For some it becomes an essential chemical solution to the problems of life.

All that can usefully be said with respect to this argument against making marihuana easily and legally available is that our society has clearly resigned itself to the treatment of its alcohol invalids. It is, moreover, well advanced toward the acceptance of many other chemical casualties. Marihuana exists, its use is spreading, and it has now begun to compete with other drugs for the allegiance of vulnerable people. It is not especially useful to wish that this were not so and to pretend accordingly. We must simply accept the fact that in the future our patient population will include an increasingly large number of people who have become pathologically dependent on the use of marihuana.

4. There is no evidence in North America that would indicate physical injury to the body. In such

countries as Egypt, Morocco, and India, however, where the use of *Cannabis* is endemic, a number of studies have concluded that physical damage does indeed occur in heavy users. The problem with such studies, however, is that the users tend to come from very oppressed social groups and the physical and mental disturbances ascribed to marihuana may in fact be a result of physical and social deprivation. Still, it must be admitted that knowledge of the effects of long-term or chronic use of marihuana is singularly incomplete at the present time.

5. The use of marihuana in this country, while not tending, at least at the moment, to lead to the use of heroin, undoubtedly is associated with the use of the amphetamines and LSD. In a recent study in Toronto we discovered that three out of four of our population of marihuana smokers had tried one or another of the hallucinogens. The acceptance of marihuana appears to lower the resistance to LSD, and for a certain number of people the much more explosive drug becomes the chemical of choice.

It is often said that governments everywhere are inclined to block the introduction of marihuana because they depend so heavily on the taxes from alcohol. Marihuana, it is said, completely replaces alcohol wherever it goes. This is certainly false. Some very youthful people reject alcohol because it seems to them that this chemical is a symbol of the middle class life style. It is far more common for marihuana use simply to be added to alcohol use, though as a rule the two drugs are not taken together. In fact, a person who once accepts the principle that to be intoxicated is a desirable goal will commonly express a willingness to swallow almost any chemical that promises to alter the condition of his consciousness. In fact, one of the most vexing problems now emerging is that of the multiple use of drugs. At least a few inveterate trip-takers have even used heroin, though in general the marihuana-using population has as great a horror of this drug as has the alcohol-using majority. However, multiple drug use probably develops from the same social circumstances that have facilitated the spread of marihuana. If marihuana use is seen merely as an indication of that process, then it is not logical to conclude that marihuana itself is the primary cause of multiple drug use on the one hand or of vulnerability to heroin on the other.

6. A good many of the people who come into contact with marihuana are immature or unstable or both. The use of marihuana does not facilitate maturation and will indeed be a hindrance to further growth. Useful insights are not often gained under the influence of this drug, and the problems of life are not resolved. Alcohol and marihuana only postpone the need for their solution. In fact it could be said that the continued use of any chemical to solve problems in living prevents the user from learning the techniques of realistic adaptation to stress. The continued use of marihuana, pleasurable at first, may tend to become less so with the passage of time. Though many people are disaffected before they begin the use of marihuana, this drug reinforces their tendency toward passive withdrawal. The result is helpless inactivity and disillusionment; adjustments to life in the world, inadequate to begin with, become an insuperable problem. Through rationalization, re-

treat is regarded as virtuous and honest. Through projection outward of the individual's inadequacy, the society is seen as cruel, hypocritical, and unenlightened. The process is complex; it develops insidiously; and the result is a person who prefers images and dreams to a real world that demands restraint, co-operation, and adaptation. Such people eventually seem to be apathetic and ineffective. They are unable to endure frustration of any kind, and they seem unable to postpone immediate gratification of their desires. They are threatened by the thought of forming long-term plans and more and more they come to live entirely in the present, being unable even to concentrate on any particular matter for more than a moment. Their thinking shifts inward, and information from the environment fails to register. As a result their explanations become progressively more subjective and finally magical; and all the time marihuana and perhaps more potent drugs serve to reinforce this highly personal interior view of reality.

Variations of this pattern are frequently seen in a population of marihuana users. The appearance of this process, which does seem to be related to the use of the drug itself, may in fact be the only really convincing argument against its use. Of course, even this argument is not altogether satisfactory because it may depend on the simple truth that clinically ill people exist in the society and that these people may be attracted to marihuana. It is not the usual procedure in our society to deny the majority its satisfactions because a minority might be vulnerable to injury on exposure to the same experience. It is the responsibility of the society to identify and assist those of its members whose response to its freedoms and benefits are maladaptive. If the majority of the people do not need and do not want protection, then it is moralistic and uncivilized to pass or maintain such protective legislation in the interests, presumably, of the vulnerable few. However, if it is finally shown that not only sick people but also immature people are unwittingly recruited into the alienated subculture through the process of chemical conversion, then the changes in the law that are now proposed may be in poor social perspective.

The marihuana controversy, I have no doubt, will be resolved in the course of the 'seventies. For the present I am willing to admit that there are in our society many who are more far-sighted than I can ever hope to be. In late 1969, for example, it was rumored, probably inaccurately, that a large American tobacco firm registered copyrights for the famous marihuana names *Jamaica Red* and *Acapulco Gold*.

27.

Airplane Glue and its Successors

If men in their thirties and forties are asked whether they ever experienced any odd sensations while making model airplanes as children, some will recall that they did. They will say that they felt woozy, a bit giddy, and were sometimes unexplainably inaccurate. This unpleasant condition would quickly disappear if they would open a window and let some fresh air circulate in the room. Beyond such personal recollections there have for decades been occasional references in the medical literature to intoxication with such chemicals as toluene and gasoline. These references have been to cases of accidental poisoning in industrial settings; and a few have referred to women who have been overcome by the fumes of carbon tetrachloride in homes. (94) (95) (96)

In the course of the twentieth century technological culture advanced spectacularly and thousands of extremely toxic products gradually became essential elements in contemporary society. It was inevitable that cases would begin to be reported of the intentional inhalation of volatile hydrocarbons for the purpose of achieving inebriation. In 1952, Faucett and Jensen described a case of addiction to gasoline fumes in an 11-year-old boy. (97) This phenomenon seemed novel, at best a medical curiosity, until the publication of Glaser and Massengale's paper on solvent sniffing in children in 1962. (98) However, with the perspective of history we can now see that the transition from the isolated case of the 'fifties to the fadist epidemics of the 'sixties was not so abrupt after all. Penal institutions have been aware of paint thinner and gasoline sniffing and of nutmeg and mace ingestion for decades. These practices have been especially common in juvenile correctional institutions and therefore were certainly known in the communities from which the inmates came. (99) In any case, in the early 'sixties in a number of large American cities, glue sniffing as a symptom of social malaise increased strikingly in prevalence and was duly noticed and described.

No one knows where it all began, but we do know that television sensed the phenomenon immediately and that the news was spread instantaneously to every community that was wired into the communications network. This sudden diffusion of detailed information concerning methods and effects is an outstanding example of the truth of McLuhan's concept of the global village. Glue sniffing became a fad everywhere almost at once.

Now it is true that airplane glue was used initially. Children could buy the necessary cements very freely and the material was cheap. It was also exceedingly easy to steal the little tubes of cement, at least in the early days of the fad.

However, with electric haste the word was soon spread that a great many other commonly available household and industrial products could also intoxicate. The term *glue sniffing* soon became historical and had to be replaced by a much more general term.

SOLVENT SNIFFING

For children of 12 intentionally to sniff solvents to the point of drunkenness seemed at one time to be a most astounding thing. Now that a few years have passed we can begin to see that such behavior is really only a logical extension of the widespread use of mind-altering drugs in the general population. Alcohol and such ostensibly medical drugs as the tranquillizers and the sedatives are excessively used by millions of people. The use of marihuana and the hallucinogens is increasing steadily among young adults. To reduce mental stress chemically has become a characteristic of our age. To achieve euphoria and novel sensory experiences with drugs has become a popular desire. It is perhaps not surprising that children from eight to 16 years of age have begun to emulate their elders by welcoming the knowledge that a dazzling array of commonly available products could intoxicate.

CHEMICAL COMPONENTS OF SOLVENTS

Solvents are nonalcoholic liquids known as volatile hydrocarbons. They have low boiling points and they evaporate quickly at room temperature. They do not readily form solutions with water but they do with lipids or fats. Thus these products are described as being volatile solvents or as lipid-soluble solvents.

Much is now known of the effects of alcohol and some other drugs on the human system, much less about the way volatile solvents work. It has been observed, however, that the more fat-soluble a chemical is, the more intoxicating are its vapors. For this reason, most researchers believe that volatile solvents have some effect on the structure and function of the fat components of the cell membranes which are part of all body tissues, including, of course, those in the nervous system. As to the exact nature of this action there is no agreement as yet, but it is clear that intoxication occurs when cells of the brain are affected.

The group of household and industrial products most commonly used in solvent sniffing includes polystyrene cement, nail-polish removers, lacquer thinners, lighter and cleaning fluids, some anesthetics, and gasoline.

CEMENTS

Probably the most commonly used material is still polystyrene cement. The principal intoxicant in model airplane glues is toluene, but some of these cements also contain other intoxicants including hexane, cyclohexane, and naphtha (all of petroleum origin) as well as acetone and ethylacetate. Various household cements contain such intoxicants as isopropanol, acetone, methyl ethyl ketone, and toluene.

NAIL-POLISH REMOVERS AND LACQUER THINNERS

Nail-polish removers contain acetone, various aliphatic acetates, benzene, and alcohol. Some also contain toluene. Lacquer thinners contain toluene, aliphatic acetates, and methyl, ethyl, or propyl alcohol. Even if we are willing to offend the juvenile hobbyist by making his indispensable cement obnoxious, the reader will agree that we would approach the denaturing of nail-polish remover with some trepidation.

LIGHTER FLUID AND CLEANING FLUIDS

These products contain naphtha of petroleum origin, perchlorethylene, trichlorethane, and carbon tetrachloride.

GASOLINE

This material contains, of course, naphtha and benzene. The juvenile sniffer siphons it from parked cars.

ANESTHETICS

The volatile general anesthetics abolish the perception of stimuli, produce an hiatus in consciousness, and obliterate motor activity. Opium, mandragora, and alcohol have been used throughout history to lessen pain, but the modern anesthetics have been known only since 1772 when Joseph Priestley first made nitrous oxide. This drug was later called laughing gas and it was the first of a series of volatile general anesthetics. Today nitrous oxide is sometimes used to keep whipping cream under pressure in cans. Trip-takers inhale this gas and thus achieve the excitement of light anesthesia. It is interesting to note that ether has been used in precisely this way for over a hundred years. In the 1840's ether frolics were not uncommon in England and the United States.

CONSEQUENCES

The glue sniffer squeezes the contents of a tube of glue into a paper or plastic bag. He holds the bag in such a way as to concentrate the vapors and prevent their escape. He then deeply inhales the vapors until he achieves the mental state desired. The other substances are similarly inhaled and again every effort is made to prevent the dilution of the vapor through air circulation. Sometimes naive children will put the bag entirely over their heads and this can lead to suffocation.

ASPHYXIATION

Within a very few minutes the subject experiences euphoria, slurred speech, confusion, and a dizzy feeling. In the early stages the excitement, the delusions, and the hallucinations are quite similar to those frequently described by people in the early stages of general anesthesia. As the concentration increases the narcotic effects prevail and drowsiness supervenes. This state leads to unconsciousness. It may be that this effect is the real cause of the deaths attributed to glue sniffing in the literature. The child who loses consciousness while his face is closely applied to a plastic bag may fall into the mass of hardening cement and be asphyxiated by enclosure in bag and cement. More often, however, the child who loses consciousness tends to fall away from the bag, is immediately bathed in air, and thus rapidly recovers.

ACUTE INTOXICATION

The character of the intoxication will depend on the intensity of exposure, the personality of the user, the setting, and probably the type of solvent used. In general the child experiences dizziness, a sense of well-being, and a feeling that he is drunk. (100) There have been reports of impulsive and aggressive behavior and of feelings of great strength. In such cases bizarre and dangerous behavior may be seen. The immature mental organization of the juvenile is particularly vulnerable to acute derangement, and values only partly learned may easily be rejected. When a child comes from a home or subculture in which values and sentiments are poorly formed or actually negative in terms of those subscribed to by the larger society, the possibility of anti-social behavior can easily be appreciated.

There are distortions of perception, visual and auditory hallucinations, delusional ideas, and marked changes in affect. These effects may last from five minutes to half an hour, but occasionally the sniffer will remain with his supply and inhale from time to time whenever he feels he needs another lift. In this way some sniffers have been known to stay intoxicated for many hours at a time. In any case, whatever the conclusions may finally be concerning the question of organic damage, there is no disagreement regarding the hazards of acute intoxication.

DANGEROUS BEHAVIOR

Unpredictable and possibly dangerous behavior referable to acute intoxication with solvents has been described by many authors. (98) (100) Fighting is described in over half the cases and frequently there is diminished awareness of any injuries sustained. There is also a commonly reported feeling of omnipotence. This accounts for the occasional child's decision to try to outrun a train or fly from a garage roof. Good judgment depends on normal thought processes, and thus a child intoxicated with solvents is capable of imagining that he is impervious to injury. In this state of mind he might leap from the roof not because he imagines he can fly but because he is convinced that he cannot be hurt in any fall. In the general merriment that sometimes attends sniffing parties a variety of mischievous acts are engaged in and some of these might accidentally threaten the security of other people. In a study of sniffers in Toronto the researchers were frequently told of stone throwing and fire setting by children intoxicated with solvents. (101) Death has occurred from exploding gasoline when this substance has been sniffed and when matches and cigarettes have been used as well.

DEPENDENCE

Tolerance regularly develops. The child who achieves the desired hallucinatory high on one tube in the beginning will require several tubes after three months of weekly use. Craving and habituation have been extensively described but physiological addiction and abstinence symptoms remain questionable at this time. Some children show restlessness, anxiety, and irritability following withdrawal but these symptoms appear to be psychological in origin.

CHRONIC DAMAGE

There is clearly much disagreement as to the degree of physical injury caused by solvent sniffing. Some studies have reported no damage or very minimal and transient abnormalities. (98) (100) (102) (103) Others have suggested that there is definite physical injury referable to this practice. (104) Sokol (105) found some kinds of blood abnormalities in 76 per cent of his subjects. He concluded that sniffing had a toxic effect on the blood-forming tissues in the bone marrow. He also found that 75 per cent of his subjects showed urinary abnormalities including pus, bacteria, and blood in the urine. He believed that sniffing put a toxic burden on the kidneys. In the Toronto study, however, no conclusive evidence of kidney damage or of injury to the bone marrow was found. Press and Done reported that vague neurological signs, enlarged liver and, rarely, acute increases in the blood pressure of the vessels of the brain had been observed. Many of these findings appear to be acute and transient; they clear shortly after the period of intense exposure. This is certainly the case with respect to the question of brain damage. Electroencephalograms have often been reported as abnormal during and immediately following exposure to solvent fumes. No EEG abnormalities persist, and there does not seem to be any other evidence of brain damage referable to solvent sniffing.

The question of liver damage is especially controversial. Some studies have suggested the possibility of some acute or chronic inflammation of liver cells, but there is by no means universal agreement on this issue. The injuries observed have generally been minimal, if they have been found at all, and the consensus has been that at least with the cessation of sniffing the liver would tend to make a full recovery.

DAMAGE TO CHROMOSOMES

The Toronto study was the first to examine the chromosomes of peripheral white blood cells in a group of sniffers and non-sniffing controls. The results suggested that there might be some injurious effects on the chromosomes due to sniffing, but much more work remains to be done to establish this relationship definitely. In the group of sniffers there were chromosomal abnormalities including chromosome breaks and chromatid gaps in 6 per cent of the cells examined. Two blood specimens contained single examples of extremely rare triradial and quadriradial chromosomes. On the other hand, the control subjects did not show any evidence of chromosomal breaks and no complex chromosomes. The incidence of minor changes was not appreciably greater than what one would expect to find in the general population.

The significance of these findings is by no means clear. The newspapers suddenly announced that glue sniffers were certain to die of leukemia in some brief period of time; but this conclusion was entirely unwarranted on the basis of the findings.

The question as to whether abnormal chromosomal structures might be transmitted to a second generation also cannot be answered as yet. If the white blood cells show certain abnormalities then it may be reasonable to assume that the germ cells will be similarly affected; but this is absolutely not established at the present time. Much more work remains to be done in the matter of the suspected chromosomal damage in glue sniffers and concerning the significance of this damage should it be unquestionably proven to occur.

THE CHILDREN WHO SNIFF

THE ANTISOCIAL PERSONALITIES

Rebellious, defiant, angry adolescents generally make use of whatever practice is currently most alarming to the authorities. In recent years the intensive publicity associated with solvent sniffing has qualified this practice as an eminently suitable one to be engaged in by the juvenile dissident. It is a deviant act that can be done socially, secretively, and with increasing sophistication. For many children with sociopathic personalities, sniffing displaces or complements illicit alcohol drinking.

THE TROUBLED CHILDREN

Unhappy, depressed, anxious, self-injuring adolescents have shown multifarious maladjustments to the stresses of living. Glue sniffing is yet another of these. It is merely more current than some others. That a chemical can be used to assuage mental discomfort is one of the great messages of our time. It is not surprising that at least some of these neurotic adolescents would experiment with glue in their increasingly vigorous search for the ideal tranquillizer. However, these people are highly vulnerable to the development of dependence on whatever chemical they discover to be effective. Since the general anesthetic properties of solvents are quite satisfying to some people, the abuse of this group of chemicals will probably become a permanent characteristic of our culture.

The treatment in such cases is, of course, always to be based on the underlying illness. The passive-retreatist use of solvents is only a superficial symptom of the deep-seated emotional problem. (106) Such children are worried about many things. They feel they are failing at home, on the street, and in the school. They feel bored and rejected and they feel increasingly resentful toward the society which emphasizes their sense of inadequacy and failure. Their families tend to be disorganized and there is especially an absence of a strong male figure with whom they can identify. In the Toronto study we concluded that the father was either physically or psychologically absent in 95 per cent of the cases of heavy sniffing. On the other hand the fathers were absent in either of these senses in only 27 per cent of the control subjects who had been selected from approximately the same socioeconomic environment. Among the sniffers slightly over half of the mothers were either physically or psychologically absent, but none of the controls had to face this situation. Moreover, there is often much alcohol abuse in the homes of the sniffers.

In this condition these children, already uncertain of their value systems and unable to resolve many of the sexual and vocational problems of adolescence, are introduced to the practice of sniffing. Their peers chide them for resisting and they take the pleasurable road of least resistance. And then the solvent actually does reduce their anger, their anxiety, and their depression. They escape into a peculiar three-dimensional dream and they recover without undue discomfort. The passive acceptance of this response to the stresses of life occurs very easily in the cases of some of these children. They repeat the experience with increasing frequency and they proceed to develop tolerance but not true physiological addiction. Of the fact that they become habituated to the use of the solvents there is no doubt.

THE NORMAL CHILDREN

However, it may well be that most sniffers are neither sociopathic nor burdened with mental instability. They are relatively normal teenagers who are bored or adventurous and they try sniffing solvents because it seems to be the fashionable thing to do.

It is obvious that thousands of hobbyists have been exposed to a variety of plastic cements for many years, but only a few of these have intentionally inhaled the fumes. Now that the curious effects of sniffing are known to the general public, it seems likely that a somewhat larger number of children will at least briefly experiment with solvents. However, most of these will certainly not continue with what is actually a less than satisfying experience. Moreover, most children are apparently guided by information that some risk attaches to the use of these solvents.

In the most comprehensive demographic study done up to the present time, Reginald Smart of the Addiction Research Foundation in Toronto examined 6,447 students randomly selected from Grades 7, 9, 11, and 13. Questions were asked regarding the use of a wide variety of chemicals. With respect to the solvents it was discovered that in 1968, 7.2 per cent of Grade 7 students had sniffed solvents at least once in the previous six months. The figure rose to 9.4 per cent in Grade 9 but it dropped to 2.6 per cent by Grade 11. By Grade 13 only 0.7 per cent of the students had used solvents to this extent. The number of boys who had sniffed more than seven times in the previous six months was less than 1 per cent in all grades except Grade 9. In that year 2 per cent of the boys had sniffed more than seven times.

Studies, other than demographic ones, have clearly been based on the two disturbed groups of children. The reason for this is obvious. As with every other mind-altering chemical, the chronic user tends to be a member of the group with underlying and persistent abnormalities. His chronic use and increasing dependence on his chemical leads to further deviant behavior and eventually some response from the society. Thus heavy users of solvents have generally come to the attention of the police and hospitals and most of the studies have made use of patients from these sources. (100) (107) (108 (109)

The general profile of the sniffer that emerges from such studies is as follows:

1. Most chronic sniffers have shown previously delinquent behavior. They have been charged with a variety of crimes including car theft, running away, burglary, truancy, and malicious damage before being identified as sniffers.

2. They tend to be restless and overactive; they cannot stick to any one task for long.

3. They are accident-prone.

4. Their school performance is generally poor. They are considered to be behavior problems and they receive poor grades.

5. They come from multi-problem families. There is much discord in the homes and a high frequency of marital breakdown.

6. The sniffers show marked feelings of inadequacy, low self-esteem, impulsivity, and low frustration threshholds.

Such children have been described as insecure underachievers and are felt to be crisis-oriented. Working with them has been difficult indeed and the rate of recidivism has been high.

This group has now become an established element in our culture. Most of the anxiety referable to the use of solvents derives from the behavior of this group of persistent users who have gone on to the development of tolerance and dependence. The conclusion may be reached that we do indeed deal here with yet another expression of an ancient social problem. Persistent glue sniffing is a symptom of the social and emotional deprivation of children.

However, there is a far larger group of children who have experimented with glue in social settings but who are otherwise quite normal. They are able to cope with life in this society, though they may indeed express some defiance against authority figures and they may show passive rejection of conventional patterns of behavior. These are the children who may try solvents for reasons other than a felt need to reduce anxiety, anger, or depression and who will shortly give up the practice altogether.

Indeed it would seem that the largest number of children who have sniffed solvents have done so out of curiosity, bravado, or an urgent desire to conform to the practices of a peer group. There is a curious peak of ill-considered adventurousness in Grade 9, but this condition steadily diminishes with each succeeding year. It is rather likely that the greatest number of these children give up the practice shortly after they begin their experiment. There is a very large social element in all this, and whether or not a child will investigate solvent sniffing will depend overwhelmingly on the prevailing attitude toward this practice among his peers in the school and in the community. The impression here is that this attitude, which was noncommittal or even favorable in the mid-'sixties, is now progressively more informed and critical. Although for a limited number of children, the practice appears to stem from deep-rooted personality disturbances, it may well be merely a passing fad for most. (110) The insecurity of adolescence is not a new phenomenon, but the combination of this state with greatly increased freedom of choice, an abundance of chemicals, and an increasingly permissive attitude toward free expression and experimentation probably accounts for the phenomenon known as juvenile solvent sniffing.

There is very little information available concerning groups of well adjusted occasional sniffers of solvents. It is not known, for example, whether a normal, secure, and productive child can become habituated to the euphoria and perceptual distortions of solvent intoxication. One would imagine that such a child might have the experience but would not find that this particular thrill represented a welcome and necessary escape from the anxiety, boredom, and hostility commonly encountered in the lives of the children vulnerable to habituation. There is something peculiarly age-specific in the use of solvents. Though the pattern has been studied now for well over six years, the subjects consistently show a mean age of about 14 years. The question arises, then, as to what happens to the sniffers after they live beyond the age of solvent use. As yet there are not sufficient data either to confirm or deny the belief that the sniffer will graduate to the use of other drugs, or that he will engage in other adult criminal activity.

Certainly the habitual sniffer is compromising himself by being out of contact for extended periods of time during a part of his life when maturation is proceeding rapidly in people of his age group. Since he is already behind, it may be supposed that sniffing results only in his further retardation. This in turn would tend to confirm his sense of futility and lead to the repeated use of a magic solvent that resolves his feelings of anger and anxiety. Later, when solvents are no longer regarded as acceptable chemicals for him to use, it seems likely that he will turn his attention to the array of chemicals commonly available in the society and select from these his new drug of choice. However, all this is entirely speculative as yet and no transition to narcotic drugs, marihuana, alcohol, amphetamines, or barbiturates has been clearly identified. It merely seems likely that to have experienced habituation at ten is to become less resistant to habituation at 20.

Solvent sniffing will probably continue to be endemic but progressively less fadist in our population. Maladjusted children will continue to experiment with an increasingly wide variety of volatile solvents, and some of these children will do damage and be damaged. However, the relatively normal children who have tended to experiment with these substances in recent years will probably avoid such practices through knowledge of the hazards involved and through a desire to avoid what will eventually become known as one of the stigmata of failure.

28.

Chemical Ecstasy

About 60 years ago William James, experimenting with nitrous oxide, developed the belief that there were many levels of consciousness other than the normal waking one. He felt that no account of the universe would be complete without reference to these other forms of consciousness.

In the early 1960's Aldous Huxley suggested that beyond rational consciousness there were such realms as esthetic consciousness, visionary consciousness, and mystical consciousness. He and a number of others, including Richard Alpert and Timothy Leary, observed that Western culture was essentially rational, Protestant, and pragmatic and that it was therefore hopelessly limited. These people especially admired William James for his explorations into the mysteries of the mind, and they honored Carl Jung for his mystical variations on the psychoanalytic theme. The Canadian physician R. M. Bucke was also recognized long after his death as an important early prophet in the area of cosmic consciousness.

THE WAR AGAINST WORDS

Huxley insisted that words were heavy burdens because they defined and therefore circumscribed thought. Words, he felt, reinforced dogmatism and bigotry and as such were the cause of most of the ills of society. Words ossified the mind, and a whole population of petrified people could only perpetuate the hideous practices of the past. Moreover, the institutions of religion, economics, and education tended to be viciously defensive in their verbal bastions. Any enlightened man presumptuous enough to challenge this fossilized system of thought would be destroyed.

It was recognized that the war against Western culture could not be won by a few dedicated knights. Artists, visionaries, and mystics had from time to time pricked at the lumbering beast, but the powerful word-culture had at no time been more than annoyed. The word-culture simply went on refining its concepts of freedom and democracy, its amazing technology, its miraculous medicine, and its immense knowledge of animate and inanimate things of the world.

However, in the years following the end of World War II the reaction against the protean forms of the culture began to be derived from a progressively wider base. The elitist irrationalists of the past were swallowed up in a broad popular movement, the basic philosophy of which was opposed in detail to that of the technological society.

Perhaps Western culture became the host of such dissidents because it was precisely the opposite of what these attackers said it was. Its continuous revisions, its genius for accepting new and even revolutionary ideas, its urgent desire to maintain individual liberty and to improve the living conditions of its people allowed it to tolerate destructive and even anarchistic irritants. But some of the same factors also caused it to develop to such a gigantic size that many of its people could no longer comprehend it. It might be said that contemporary freedom has presented great difficulties for people with limited internal restraints and, similarly, that modern technology has created a situation that is frustrating to the unlearned. The result has been the irrationalist revolt.

Man, it is argued, is a non-rational being who has been enslaved by words and electronic robots. There is certainly no doubt that, in recent years, modern technological society has become extremely threatening to man as an individual, and one of the essential reactions to the threat of scientific dehumanization has been the emergence of a new emphasis on personal experience.

This phenomenon may be seen in every age group and in every part of our complex society. For the most part the search for pleasure and experience has taken the form of an enhanced desire to explore more fully the wide expanse of waking consciousness. Leisure, political freedom, mobility, affluence, and physical health have allowed the people in at least this one small part of the world to extend immeasurably the range of their experience. This development has been, in many ways, a natural extension of the exploratory tendency of Western society — the tendency to look outward in the course of its examination of the world. However, there was a small number of people who were beginning to search for experience within themselves, a practice that was antithetical to the major impulses of Western man, and it was in this group — introspective, contemplative, noticeably isolated — that marihuana first achieved its entry into the white middle class. Marihuana was used by these people chiefly for two reasons: first, because it was a symbol of defiance; second, because its use tended to intensify the experience of the senses and to facilitate withdrawal into the self.

VARIED FORMS OF CONSCIOUSNESS

In the course of the 'fifties LSD emerged as the supreme source of drug-assisted mysticism. Normal consciousness, it was recalled, could be replaced by esthetic consciousness and this, presumably, was what poets and artists had always been able to experience. In this state of consciousness, the world is regarded as being unimaginably beautiful. It is sensed as being immediately present, utterly existing. There is a sense of finality in the perception of the esthetic consciousness, and to experience this is to be filled with joy and satisfaction.

However, the user of LSD may soon pass beyond this level of consciousness and into the stage of visionary consciousness. Now the world is felt to be unfathomably mysterious. Words become useless; no verbal description of this experience is possible. The symbols of this vast vision tumble dazzlingly before the mind, and everything is felt to be utterly meaningful yet always inexplicable. As one descends more deeply into this phase, it is transformed into mystical consciousness. Though the world is seen to be infinitely diverse, it is nevertheless completely one. Every point in space and time is fixed in unity; every changing, infinitely varied element of the universe is seen and integrated. Everything is seen to die and to be reborn at once; no opposites persist; there is perfect order in chaos. In the stage of mystical consciousness there is an overwhelming feeling of vast oceanic space.

No longer is dedication, self-discipline, long study, belief in a philosophic or religious system, sensitivity, intelligence, or even a creative imagination necessary. The 16-year-old in Yorkville or Haight-Ashbury may have experienced very little of the world and learned comparatively little before he ran away from home. He may have a very modest intelligence, no interest whatever in religion, and a considerable commitment to action for the sake of avoiding boredom. He may never have heard of William James, Humphrey Osmond, Timothy Leary, or Alan Ginsberg and yet he will, today, be able to enter the imponderable realm of mystical consciousness. This is a very curious and interesting state of affairs.

SMASHING THE PATTERNS

Leary, in referring to imprinting, reminds us of the remarkable work of Conrad Lorenz. Some young goslings, at some critical moment shortly after being hatched, happened to see Lorenz; thereafter they tended to follow the man as though he were the mother goose. All this is quite true. It is also entirely likely that babies are imprinted in an exactly similar way, though the complexity of the human brain far exceeds that of the gosling and Leary's alarm is probably, therefore, not quite justified. In any case, Leary suggests that the hallucinogenic drugs disrupt old imprinted patterns.

In the state of chemical mind expansion, all is flux. All pre-existing patterns are violently smashed and then, says Leary, new imprinting may occur. This, he says, is probably the basis of the death of the mind and its rebirth in ecstasy that is so commonly reported by both sages and imbeciles under the influence of the hallucinogens.

This theory is remarkably similar to that of anaclitic therapy in which it was held that the patient must first regress to helpless infancy before he can be nurtured to healthy maturity. LSD recreates the totipotential infant in the man. This all-knowing chemical guide then carries him to new worlds of irrational wisdom. The fixed, stony wall of pre-existing concepts is broken down and the initiate is brought to the boundless realm of ineluctable truth. This is why Leary speaks of the need to go out of your mind to use your head.

Leary says that the old, tired word-culture insisted upon everything being measurable and manageable. The brain, he has frequently insisted, is composed of 13 billion neurons and yet our thinking, restricted by hard words and unbreakable concepts, lurches along at no more than three concepts a second. The vast brain dies from disuse, and the culture perpetuates this particular variety of death. The irrationalists would like to see the shackled minds of all the people expand to the point beyond which no return to captivity is possible.

FROM INSIGHT TO ECSTASY

It was in the late 1950's that LSD first emerged from laboratories, mental hospitals, and clinics and appeared on the streets. The early explorers particularly emphasized the mystical state that it induced, and complex justifications were advanced to the effect that users had been miraculously endowed with tolerance and wisdom. In fact, a number of people insisted that instant satori or divine enlightenment was possible and had been experienced. A Zen monk would have studied and meditated for many years to achieve this state of ineffable bliss, and even then he would regard this experience of oceanic oneness with God, nature, and man as only a beginning in his search for transcendental oblivion. The trip-takers, on the other hand, conceived of this state as an end in itself, and as hundreds of followers began to emulate the early leaders, the goals of trip-taking began to change. The claim was more seldom heard that the use of the drug was enlightening or that it conferred fundamental insights that would be of inestimable value in the pursuit of the civilized life. More and more, the goal was euphoria and the experience of novel distortion of auditory and visual sensation. In every country the first people to use the drug tended to be unusually sensitive, creative, and intelligent; but as information about LSD spread and resistance to the use of the drug diminished, decidedly less-gifted people began to use it. With this development there was an inevitable loss of idealism and an increase in ill-considered adventurousness. The goal became the high, the supreme intoxication, the ecstatic state for the pleasure of ecstasy alone. Before long, LSD had become a recreational drug.

Some of the irrationalists may well deplore this state of affairs. Some of them, however, may applaud it because for them it may not matter how the revolution comes about. To be successful, the revolution must have a broad popular base and it probably is of little importance that the masses of people have never been celebrated for their refinement, imagination, or intelligence. In fact, LSD does not expand the mind of an ordinary person into one of massive genius like Aldous Huxley's. A limited mind will have a limited psychedelic experience, Dr. Leary's 13 billion neurons notwithstanding. Yet the disruption of normal thought processes is startling enough to alter any person's judgment of the world after his return from ecstasy, and his intense suggestibility in the course of his intoxication will involve him more certainly in the values of the drug-taking culture. He may not comprehend the significance of these values or the consequences of their being espoused, but he will tend to hold to them irrationally and to withdraw from discussion on the ground that words are inflexible and limiting. To be spontaneous, feelingful, and non-verbal is to be freed from the cruel chains of conventional culture. It is apparently a very easy solution to the stresses of life. It is certainly easier than co-operating, adapting, learning, and persevering.

Today the use of LSD is prohibited in most places and its possession is condemned. The pharmaceutical house that developed the drug and was its only importer into North America has now abandoned this work. A few research institutions still have supplies of the drug, but today the major sources of LSD are clandestine laboratories. As a result, the material sold as LSD is now commonly contaminated with a great variety of other drugs, and no buyer can ever be certain of the potency and purity of his purchase. In clinical settings when pure LSD is used and when there is safety, guidance, and free availability of antidotes, the incidence of panic reactions and other side effects is less than 1 per cent. On the street the freakout is a common occurrence. An impure drug may be taken by people who are pre-psychotic or immature, there may be no person present who is free of the drug, there may be anxiety concerning the possibility of a sudden intrusion by the police, and there are no antidotes. That nightmarish experiences sometimes occur under such unfavorable circumstances is not surprising.

Yet LSD is no doubt one of the most interesting and important drugs of our time. The injudicious use of this remarkable drug by great numbers of people who are unprepared for the experience — and who indeed may never be prepared — is truly regrettable. The spread of the drug and its immoderate use has led to a strong reaction on the part of legal authorities everywhere. This reaction has not apparently had much effect on the determined trip-taker, but it has somewhat limited responsible research into the nature of the drug.

A FORTUNATE DIVERSITY

LSD may still be shown to have a limited but significant place in medicine. The drug will certainly be important in the study of altered states of consciousness. In the non-medical area, LSD may continue to be valued by individuals as a source of chemical ecstasy.

Perhaps the error of the irrationalists is in assuming that the transcendental state is necessary or desirable for all men in every culture, though it may be strongly desired by some people some of the time everywhere. Not everyone in a population composed of extraordinarily unlike people would enjoy the sensation of losing his hold on reality. Some people would prefer to build bridges, and some others would prefer to determine the structure of the DNA molecule. This diversity is fortunate, of course, because the LSD habitué is unlikely to be persistent enough to do the first or learned enough to accomplish the second.

29.

The Search for New Hallucinogens

In the 'sixties the search for psychoactive drugs was intensified both in scientific circles and among people who were seeking escape from what they considered to be the dungeons of the mind. Chemists, ethnobotanists, and reluctant prisoners were all, in their own way, remarkably successful.

First of all, there was the rediscovery of a number of venerable psychotropic drugs that had been known and used by the Indians for hundreds of years. Thus psilocybin and mescaline began to appear in the hip community and, before long, the seeds of several varieties of morning glory. Nutmeg and mace experienced revivals in their turn, and much attention was paid to the work of botanists who occupied themselves in exploring the rich flora of Central and South America. Thus a great variety of tryptamines was identified whose names were quickly reduced to mysterious three-letter words. DMT and DET became nearly as famous as LSD, and the search increased in urgency. A chemist named Alexander Shulgin working for the Dow Chemical Company synthesized DOM, and this potent new hallucinogen was renamed STP. In the Haight-Ashbury it was suggested that STP stood for serenity, tranquillity, and peace. Shulgin went on to invent a dozen more hallucinogenic drugs for Dow, and after the U.S. Army began testing these preparations in the course of chemical warfare research the formulae were released to the public. By the late 'sixties, with the demand for such drugs increasing rapidly and prohibitory legislation against LSD having been passed in most jurisdictions, these newer chemicals entered the field in some force. The result, in the early 'seventies, is a considerable degree of confusion.

UNDERGROUND CHEMISTRY

Today some of the chemists of the underground pharmaceutical industry are both experienced and competent, and the forensic laboratories are hard pressed to keep up with the profusion of new drugs that they are called upon to identify. It would seem that in underground circles the piperidyl benzilate group known as the JB compounds are of particular importance. Thus, batches of chemicals familiarly known as TWA and LBJ have been found to be identical and to contain n-methyl-3-piperidyl benzilate hydrochloride. This material is also known as JB-336. Two other preparations, SAM and DMZ, are identical to the well-known drug benactyzine hydrochloride. MDA or 3, 4 methylenedioxyamphetamine has also been produced by these laboratories, and in fact this material is quite often sold as mescaline, a chemical it somewhat resembles. STP (2, 5-dimethoxy-4-methylamphetamine) appeared in 1967. In 1968 TCP or the peace pill (phencyclidine hydrochloride) served to further confound the investigators, and at about the same time it was rumored that pure THC (tetrahydrocannabinol) had successfully been synthesized by the underground.

In the meantime the trip-takers themselves continued the search and were remarkably successful in quite a number of unexpected places. Thus the drug stores yielded the belladonna alkaloids and the amphetamines. Amyl nitrite was rediscovered and shown to increase the impact of marihuana. The banana peel was eventually proven to contain no amyl acetate, but the exposure of this hoax dissuaded no one from continuing the search in unpromising places. Queen Anne's lace (the wild carrot) was said to yield an hallucinogenic substance, and very soon many people began smoking the dried tops of this flowering plant. The fly agaric mushroom was definitely psychoactive, of course, but most people lacked the stamina of the Ostyak shamans of Siberia and were therefore prevented from following this route to ecstasy.

In 1968 a few people began smoking the leaves of catnip, *Nepeta cataria.* (111) This plant belongs to the mint family and has been used for a long time as a special treat for cats. The material is available in pet stores either as crude leaves or in the form of a liquid extract. Some cats actually do seem to be attracted to catnip. They play with it, nibble at it, drool a great deal, and sometimes behave in a giddy and kittenish way for a while. Catnip contains tannin and a complex volatile oil. The psychoactive principle is much less potent than marihuana, but determined users will eventually achieve some euphoria and a degree of contented intoxication. They compare the effect, not unfavorably, with that of marihuana.

Some pet stores have reported recently that they are unable to keep enough catnip in stock to satisfy the demand. Some customers have demanded 25 to 100 lb. bags. The fact that pet owners tend to buy about one ounce at a time has made some retailers suspicious.

Catnip tea was commonly used a hundred years ago to cure hysteria and the curious malady known as the vapors. Whether the terpine nepetalactin in catnip will really prove to be psychoactive I cannot say at the present time. It seems likely that there is a considerable placebo effect in the reactions that have been reported up to now. At any rate, I have not yet heard anyone claim that catnip opened the doors to cosmic consciousness.

By the end of the decade the search had become much wilder and certain people had emerged who specialized in trying almost anything in the interests of underground science. Thus meat tenderizer was injected intravenously by a few people in the midwest; and in New York, according to Donald Louria, trip-takers were risking lung embolism by injecting suspensions of peanut butter into their veins. A few desperate people injected milk intravenously as well; and still others took a chance on intravenous mayonnaise in what must surely represent the *reductio ad absurdum* of the trip-taking impulse.

The next phase concerned the mixing together of two or more psychoactive drugs. LSD, mescaline, and cocaine; LSD and Methedrine; LSD and strychnine; and LSD and heroin have all been concocted. Pickled marihuana is compounded of marihuana and scopolamine. The use of combinations of DMT and marihuana, and of opium and marihuana have been claimed. The point, really, is that hundreds of combinations are entirely within the competence of the underground manufacturers; and this fact greatly adds to the disorder on the streets and in the analysing laboratories. It has been claimed that the addition of Comet cleanser to a product renders analysis impossible, but Dr. Joan Marshman of the A.R.F. laboratories has pointed out that this would not be the case in sophisticated laboratories at any rate.

THE IMPURITY OF ILLICIT DRUGS

Dr. Marshman has reported on another matter of considerable significance. During 1969 she examined a large number of drug specimens that had been collected by A.R.F. field workers. On analysis it was shown that only 62 per cent of the material contained chemicals that were said to be present at the time of purchase — and this included samples of marihuana and hashish which were almost always as represented. If these samples were excluded, only 52 per cent of the specimens contained what they were supposed to contain. In the case of the LSD samples, 54 per cent contained relatively pure LSD, 14 per cent were quite impure, 21 per cent appeared to represent unsuccessful attempts to synthesize LSD, 9 per cent contained no drug at all, and 2 per cent contained some chemical that could not be identified. The same sorts of findings were made for numerous other drugs. The conclusion that must be reached is that it is a decidedly risky practice to buy and use allegedly psychoactive materials from the streets. The buyer simply cannot know what it is that he has bought.

We may be quite certain that the search for illusionogenic drugs will proceed and that many remarkable new drugs will be discovered. Each one of these drugs or combinations of drugs will make the controversy surrounding the use of any one drug more markedly academic.

30.

The Chemophilic Society

In this book many reasons why people have used drugs to alter consciousness have been discussed. These have included a desire to achieve mystical union with God, to escape from mental distress, to endure, to kill, to convert or be converted, and to experience pleasure for its own sake. Some of these uses are ancient but all of them are modern, and never before has there been a glorification of the chemical way of life as pervasive, untrammeled, and popular as we see today among the millions of people of Western society.

Some of the reasons for this can be adduced. Since the middle of the nineteenth century the chemists have been extraordinarily inventive. The array of mind-altering chemicals today is dazzling. Circe may have given Odysseus nepenthe because nepenthe was the only drug in her medicine cabinet. Today she would be infinitely more selective. Her real problem would have been whether her choice would cause unwanted reactions when mixed with the chemicals that Odysseus was already taking.

The easy availability of drugs is one of the problems today. The chemists invent; the pharmaceutical houses manufacture; the advertisers advertise; the doctors prescribe; the druggists dispense; and the people eat, apply, swallow, insert, and inject. The demand increases in urgency with each new miracle, and the miracles are now occurring at a rate that exceeds the capacity of every one of these groups of people to adjust. Thalidomide is only the most grotesque example of this truth.

The general threshhold for physical and mental discomfort seems to be diminishing steadily. To endure is no longer regarded as a virtue. To reduce progressively more minor states of tension or pain has become a significant trend of our time, and the chemists and all the other members of the vast and complex healing industry are following along compulsively. At the same time the drugs that are consequently treated with diminished respect because of their supposed familiarity and their easy availability are becoming progressively more potent. The result has been the emergence of what might well be termed the chemophilic society.

THE MULTIFACETED REVOLUTION

The changes in our society that are now apparent everywhere are obviously part of the normal evolution of culture. Every civilization has gradually accepted new ideas diffusing from without and emerging from within, but the rate of such change tended never to exceed the capacity of people and institutions to adapt. Perhaps it is the rate of change that is most important today.

Though most of the elements of the modern social and technological revolution undoubtedly were introduced many years ago, the maturation and convergence of these ideas has resulted in a current rate of change that is explosive and probably uncontrollable. Every aspect of the culture has been affected. Every preexisting value has been either threatened or destroyed.

Arbitrarily one may decide that the new world began with Hiroshima. At least that appalling punctuation mark put an end to many of the characteristics of prewar society. People born since that time have lived in a world in which total annihilation has always been possible. Even the fire storms of World War II cannot really be compared to Hiroshima (though they may be seen as an important stage in the evolution of civilian terror). Moreover, the techniques of biological and chemical warfare briefly noted in an earlier chapter greatly extend the notion that total war in any traditional sense is now impossible.

Since World War II, electronic communications systems have altered the structure of the world beyond recognition. Children born since that War have lived in a space bombarded by fragmented images. Thoughts and feelings have been presented relentlessly as discontinuous bits of information, incomplete and yet astonishingly vivid and distracting.

The child born before the War could be advised not to engage in sexual adventures on the grounds that such behavior was immoral. The fact was that fathering a fatherless child could be seen as a criminal act perpetrated against a helpless infant. Today other reasons must be advanced, because no one need get pregnant.

The essential elements of automation were invented in the nineteenth century, but their practical application and further perfection appear to have occurred in recent years. The completion of this process by the introduction of increasingly more ingenious computers has greatly added to this particular element in the revolution. One of the results of this has been the freeing of some people from drudgery, but it has also caused far more people to be regarded as expendable, imperfect machines. The drive for efficiency and economy could not result in the exaltation of man. Indeed, his lustre further dimmed and he was more commonly condemned for his frailty than praised for his noble individuality.

The cities became huge and the people began to live in lonely cubicles encased in rectilinear arrangements composed of thousands of identical structures. The expressways cut through neighborhoods and gorged on parks, and further social dislocation was the result.

The lakes, the air, and the land were mindlessly polluted, as they had always been; but the immense increase in the number and size of the sources of pollution began to threaten every animal and plant that presumed to live in the world.

And in the meantime the human population of the world, thanking not at all the medicine and technology that had caused this effect, raced toward some point beyond which the resources of the world must fail.

In this extremity there was a profound human reaction. The culture was too big, too incomprehensible

Man was small and exhausted, and he somehow failed to appreciate the dim vision of the Utopia that technology was inexorably moving toward. It seemed to him that in this twenty-first century dream world there would be no place for man at all.

Of course the notion that the glorious sweep of technology might be examined and found to be threatening and unlovely could not be appreciated by most of the people. It was chiefly the artists who saw the need for spontaneity and immediacy. They admired the accidental in man and nature. They appreciated everything that was small and trivial. In short, the artists emphasized irrationality and frailty in direct response to the overwhelming order of the social planners and the precision of the engineers.

The gulf separating the people learned in science and technology from those who were ignorant of these things grew progressively wider. Some people earnestly endeavored to join the scientific elite. Some people reacted against it and proceeded to develop extremely hostile and negative philosophies of life. Some people reacted by simply giving up.

THREE DIFFERENT WAYS OF REACTING

In the 'sixties the materialistic basis of the society was questioned more severely than ever before. Questions were asked regarding the desirability of faster transportation, the exploration of outer space, the prosecution of defensive wars, and the mass production of luxurious hardware of every kind. It was felt by increasingly large numbers of people that human civil rights, the preservation of the environment, world peace, individual freedom, and the exploration of the self were really the important issues.

Reaction against the bewildering growth of the non-human culture took three fairly distinguishable forms. The first was a rational examination of the deplorable state of affairs as it existed, and myriad attempts at constructive change. A great many people involved themselves in this endeavor, but their efforts were largely ignored or treated with contempt because what they did was not especially shocking or newsworthy. Yet these efforts, based on genuine concern for the rights and needs of man and a belief that the society could indeed be preserved and improved, served at least temporarily to retard the decline into either anti-human technocracy or antisocial anarchy.

The second response was uncompromisingly negative and destructive. People making it concluded that the society was rotten and hypocritical. It was sexually repressed and sexually obsessed. Its people desired only to accumulate wealth, belongings, holdings, and influence. The churches were slumlords and they preached nonsense in the name of mythic gods. The society had deified time and thus all the wretched, faceless, hurrying people had been converted into mass-produced automatons. The warlords were blindly rushing toward an inevitable nuclear holocaust because they believed in such ancient principles as patriotism, nationalism, and the superiority of the chosen few. The society was evil beyond hope of redemption; destruction of every one of its institutions was necessary.

A third group also examined the society and despaired. However, their view of Utopia suggested neither rational evolution nor irrational annihilation, but rather a personal retreat. In a few remote places small Utopian societies appeared, but by far the most usual form of personal withdrawal consisted of taking up residence in one of the extended bohemias of the large cities. Small tribal groups appeared in these centres, and there the systematic rejection of the values of the larger society were most clearly seen. There the spontaneous and the immediate were especially honored, there were no responsibilities, and life was ideally free, whimsical, and passive. Time was not heeded, comfort was not valued, and the intensification of sense impressions became a constant preoccupation. In such societies marihuana became an essential element because it facilitated the withdrawal into the self that had already become a primary urge.

Today such non-artistic bohemias as the Haight-Ashbury district and Yorkville still exist, although they have changed radically. In spite of these changes, the life style that was clearly demonstrated in such places in the 'sixties persists. It has simply diffused into many parts of the larger society. And there, of course, it has become a far greater cause for concern than it ever was when it was restricted to a relatively small but noticeable group of self-isolated people.

In the 'seventies these three solutions have become more distinct from one another, and the numbers of people subscribing to each of them have markedly increased. New subscribers to each have been recruited from the persisting majority of the people who, though as affected as anyone else by the processes of change, have always attempted to adapt as painlessly as possible to each new social and technological *fait accompli*. But now, it would seem, collisions among the three visionary forces and between each of these and the uncommitted majority of the population are increasing in frequency and severity. The issue is still very much in doubt.

DRUGS AND THE DISAFFECTED

From the point of view of this book, it is the third solution that is of the greatest interest. We have an increasingly large population of disaffected people who have elected to reject in detail the life style of the larger society. They abhor competition and any expression of aggressiveness. They are not interested in tradition, and they do not admire excellence in anything other than achieving the completely passive state of mind. Contradictions and incongruities do not disturb them. Rather, it would seem that rational thinking offends them; consequently, they especially appreciate such non-logical systems as astrology and Zen. For them it is the life of inner experience alone that is rich and beautiful, and thus to heighten one's own subjective sensibility becomes the supreme goal.

When a person is already prepared emotionally t subscribe to a particular set of attitudes, it is, as we hav seen, extraordinarily easy to fix these attitudes in hi mind and put an end to whatever conflicts remain concerning them. It seems quite likely that recruitmen of inflexible subscribers to the third solution is greatl facilitated by the widespread use of psychoactive drug in that segment of the population. Among the question that must be considered by any person enticed by th attractions of the retreatist school is the fact that hi confirmation may be considerably less voluntary than he thinks. This, very likely, will emerge in time as one of the most important issues of the chemophilic age.

It would be unwise for us, however, to concentrate all of our interest on the fact that some people are using illicit psychoactive drugs and that some of these people are being helplessly converted to a life style that is inimical to society. People in every part of our society seem more and more inclined to solve their baffling personal problems by seeking the altered state of consciousness and sometimes utter, though temporary, oblivion. We are inundated by potent chemicals, and almost all of these are licit and freely available. In the chemophilic age tranquillity in the midst of every man's personal chaos is possible.

The name I have given to the ultimate mind-altering drug is Panaceazine. Its precursors surround us today, and they are held to be decidedly useful. In the near future it will be crucially important for us to discover ways of preventing Panaceazine from becoming not merely useful but utterly essential for a very large dependent population. *The chemists will not oblige. It is the society that must present a thousand convincing alternatives.*

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